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The Construction of Sectional Splints for Maxillary and Mandibular Fractures

ROGER G. MILLER, D.D.S., Major, Dental Corps, United States Army, Washington, D. C.

THE TREATMENT OF fractures consists fundamentally in restoring the fragments of bone to their proper position and holding them there until consolidation takes place. Ordinarily the simplest treatment that will give the desired result is the one to be preferred. The treatment, however, must be efficient, and the comfort and welfare of the patient must always be considered. A large percentage of fractures can be satisfactorily reduced by wiring. In this method intramaxillary multiple loop wiring is placed on the teeth of both the maxilla and mandible, and intermaxillary traction and fixation are obtained by the use of elastic bands hooked over the loops. In the final result the teeth should be in their original occlusion.

Sometimes a delayed union or a non-union of the fragments will occur and it becomes necessary to extend the treatment over a long period. Often there is extensive loss of bone or collapse of the fragments, so that parts must be held in their proper position while grafts are made. In cases of this type, it is desirable to maintain function; thus, splints, preferably of the sectional type, are indicated.

When it is necessary to use intraoral extension arms, extra-oral extension arms or rhinoplastic scaffolding, splints must be used; they serve as a base to which these appliances can be attached.

Materials Employed for Splints

Splints are made of vulcanite, acrylic resin of the clear type, and silver. Each of these materials has certain advantages and disadvantages. The acrylics, being transparent, make it possible to observe the condition of the gingival tissue under the splint at all times without removing the appliance. Moreover, the acrylics are radiolucent, and as they cast no shadows, roentgenograms may be taken with the appliance in place.

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Sometimes a delayed union or a non-union of the fragments occurs and it is necessary to extend the treatment of fractures over a long period. Often there is extensive loss of bone or collapse of the fragments, so that parts must be held in their proper positions while grafts are made. In cases of this type, it is desirable to maintain function; thus, splints, preferably of the sectional type, are indicated. Moreover, when it is necessary to use intraoral or extra-oral extension arms or rhinoplastic scaffolding, splints must be used as a base to which to attach these appliances.

Splints are made of vulcanite, clear acrylic resin, and silver. The advantages and disadvantages of each type are explained.

The preliminary procedures to the construction of the splint are outlined. These include the making of a stone model; from an impression of the fragments in their displaced position; cutting and reassembling of the model and the making of the working model which is a duplicate. On this duplicate the actual construction of the splint takes place.

The construction of a simple, basic acrylic splint is outlined in detail along with the construction of attachments to such splints. The modifications of the technique for vulcanite and silver splints are fully described.

Variations and elaborations of the basic splint for adaptability to more complicated types of fracture cases are discussed and illustrated.

Vulcanite is neither transparent nor radiolucent, but it does permit ease of construction as do the acrylics.

Silver is a stronger material and for this reason the splint may be made less bulky without sacrifice of strength. The more difficult process of casting and finishing silver, however, and the fact that silver is radiopaque present disadvantages when compared to the other two materials.

Preliminary Procedures

Stone Model—The first requirement in the construction of a successful splint is a good stone model of the remaining teeth and adjacent tissues of both the maxilla and mandible. The impressions from which these models are made must be accurate and are preferably taken with one of the hydrocolloid impression materials, although plaster of Paris may be used. The original model is always duplicated and all steps of construction are done on one or more duplicated models. By keeping the original model intact, it will serve as a case record; but more important, it will obviate the possibility of having to retake the impression in case an accident occurs during the splint construction and it becomes necessary to start anew.

Impression of Fragments in Displaced Position—Many cases present with marked displacement of the fragments. The impression is taken of the parts in their displaced position; no attempt at reduction is made at this time.

Working Model—The stone model made from this impression is duplicated, and the duplicate model is then cut along the fracture lines and is reassembled with the teeth in their original occlusion with the opposing teeth. The reassembled model is then duplicated, and it is on this second duplicated model that the actual construction of the splint takes place. This so-called working model will, to be sure, be destroyed during the casting or vulcanizing process,

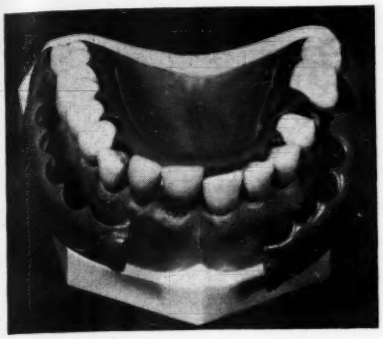


Fig. 1—Vertical split into two sections of buccal segment at median line of splint.

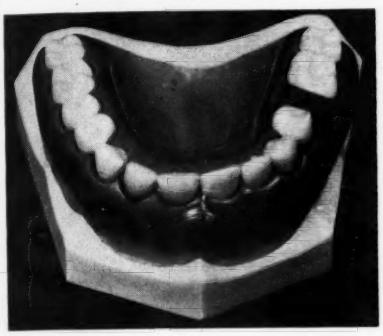


Fig. 2

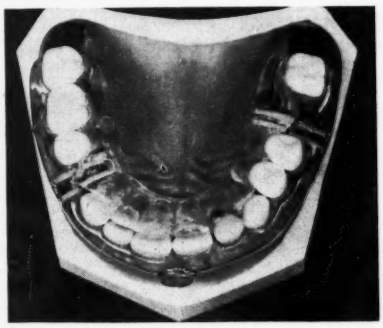


Fig. 3

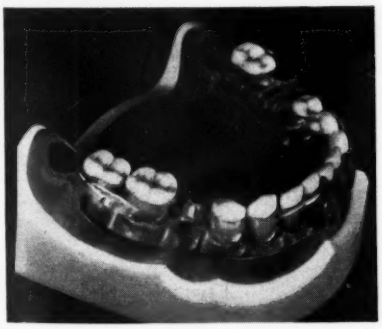


Fig. 4

Figs. 2, 3, and 4—Splints in place on models.

but the reassembled cast from which the working model was made will still be available for fitting and finishing the splint.

There are numerous variations of the sectional splint, but the following description is for the construction of the simple, three-piece basic design with the use of one of the acrylic resins. This splint consists essentially of one lingual segment and one buccal segment joined or hinged distally to the last tooth to be included in the splint on each side. The buccal segment is split vertically at the median line, thus dividing the buccal segment into two sections (Fig. 1). It is neither necessary nor desirable to cement this appliance to the teeth. For retention the sectional splint depends upon its grip on the contoured portions of the crowns of the teeth; ordinarily, therefore, the gingival and middle thirds of the teeth should be covered by the splint material. The lower border of the appliance should extend over the gingival tissue a distance of 2 mm. or 3 mm. This gingival extension serves as a protection to the gingiva and also makes mouth hygiene easier.

1. With suitable working models prepared, the adaptation of the hinges that connect the lingual segment with the two buccal sections is accomplished: Half-round gold clasp wire, 14 gauge, or nickel silver wire of the same gauge and shape are the materials best suited for this purpose. Orthodontia band material may be used but is not so satisfactory as the half-round wire. The wire is carried around the distal surface of the last tooth to be included in the splint on each side of the mouth and is kept as near as possible to the gingiva without impinging on the soft tissue. It is carried around on the buccal and on the lingual surfaces of the tooth at least as far forward as the mesial surface. At this point the wire is bent at right angles and cut off about half an inch away from the surface of the tooth on both the buccal and lingual surfaces (Fig. 5). These portions of the wire which extend at right angles to the tooth are later embedded in investment when the case is flasked for packing, and by this means the wire is held in position while the case is being packed and curved. The adaptation of the wire should be fairly accurate around the distal part of the tooth, but along the buccal and lingual surfaces close adaptation is not desirable. There should be space between these surfaces of the teeth and the wire, as the wire must be embedded in the splint material. This is possible only if the necessary space has been provided into which the material can flow.

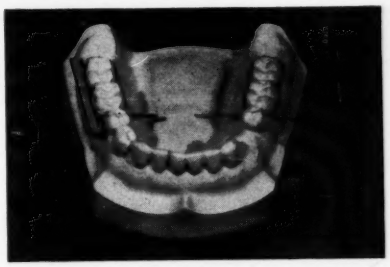


Fig. 5—Wire right angle extensions from surface of tooth on buccal and lingual, later to be embedded in investment.

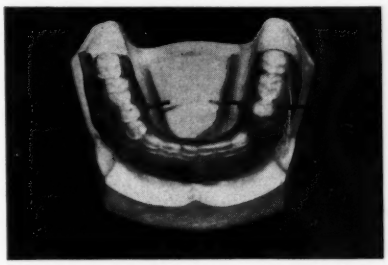


Fig. 6—Waxed splint. Note that ends of wire extend beyond surface of wax, so that ends may be embedded in plaster when flasking is done.

2. The wires are now placed in position on the model and held there with a little sticky wax.

3. The splint is then waxed exactly as it is to be when finished except that the buccal segment is solid. The cut at the median line which divides the buccal segment into two sections is made with a fine saw after the case has been cured and polished.

4. For the acrylic splint, 1½ thicknesses of pink base-plate wax should be used. The waxed splint consists of a band of wax around the sides of the model which covers about two thirds of the buccal and lingual surfaces of the teeth and extends over the gingival margins 2 mm. or 3 mm. (Fig. 6). It will be noted in Fig. 6 how the ends of the wire extend beyond the surface of the wax, so that the ends can be embedded in plaster when flasking is done. The clasp wire on the distal surfaces of the last teeth should be kept clear of wax as the spring action of the wire is to be maintained. These wires are simply connectors between the lingual segment and the two buccal sections of the splint. They hold the three parts of the splint together in a single unit, but allow the buccal sections to be sprung outward or opened in order that the appliances may be readily

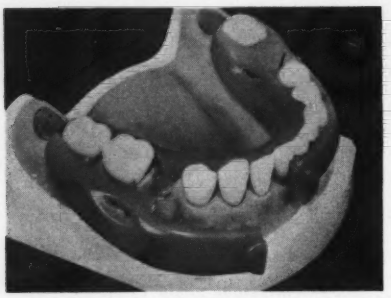


Fig. 7—Holes drilled through edentulous area from buccal to lingual, through which brass ligature wires are drawn and tightened to increase grip of splint on teeth at these points.

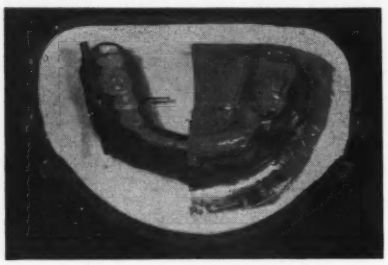


Fig. 8—Case invested in lower half of a flask with tin-foiling half completed. Note ends of hinge wire projecting beyond wax, to be embedded later in the plaster in the upper half of flask.

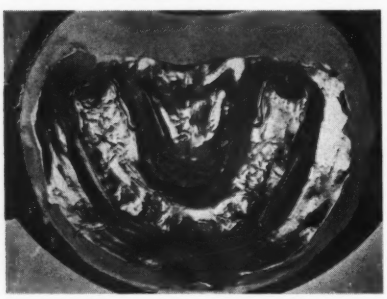


Fig. 9—Hinge wires, tubing and tin foil will be retained in the upper half of flask.

applied or removed as shown in Fig. 1. Figs. 2, 3, and 4 show the splints in place on the models. Edentulous spaces are waxed solid, the wax being carried to within a millimeter or two of the occlusal surfaces of the teeth adjoining the space.

5. When the splint is cured and polished, the material in these edentulous areas will have to be split to permit the splint to be opened. This is accomplished by the use of a fine saw and the cut is made vertically from mesial to distal at the time the median line cut is made.

6. Two holes may be drilled through one of these edentulous areas from buccal to lingual, and brass ligature wires passed through these holes and tightened will materially increase the grip of the splint on the teeth at these points (Fig. 7). The area around the openings of these holes should be countersunk, so that the twisted ends of the wire will lie below the surface of the splint, thus reducing the possibility of the cheek becoming irritated from rubbing against the wire.

7. A round, flat, undercut button, about one-fourth inch in diameter, is waxed on the buccal surface at the median line. The vertical cut made through this area will bisect the button. A brass wire passed around the halves of this button and tightened will pull the buccal sections into position and hold them, thereby producing the grip on the teeth by which the splint is held in place (Figs. 1, 2, 3 and 4).

8. Anterior teeth are often missing, and for esthetic reasons, it may be desirable to replace them with vulcanite teeth attached to the splint. This is easily accomplished. Teeth of the proper shade, size and mold are ground to fit as for any partial denture and placed in position on the model before wax is applied. The waxing is then done, the pins and ridge lap of the teeth being attached to the lingual segment of the splint. The buccal portion of the finished splint must be free to lift away from the vulcanite teeth when the splint is opened; in order to make this possible, the labial surfaces of the replaced teeth should be covered with 0.001 inch tin foil before the buccal portion is waxed over them. The tin foil acts as a separator and will permit easy separation of the splint in contact with the labial surfaces of the porcelain teeth. In Figs. 1 and 2 the upper left central and lateral incisors have been replaced in this manner. In Fig. 3 the upper right lateral has been replaced.

9. When waxing has been completed the occlusal portions of the crowns of the teeth on the stone model are cut off flush with the wax, the case is invested in the lower half of a flask, and 0.001 inch tin foil is carefully burnished over the wax and model as for any acrylic denture. Fig. 8 shows the case invested in the lower half of a flask with the tin-foiling half completed. The ends of the hinge wire which project beyond the wax and which will later be embedded in the plaster in the upper half of the flask will be noted.

10. The top half of the flask is next placed in position and the investing completed.

11. The wax is then eliminated by boiling in the usual manner. After the wax has been eliminated, the hinge wires, tubing and tin foil will be retained in the upper half of the flask as illustrated in Fig. 9.

12. The model in the lower half of the flask is now carefully tin-foiled (Fig. 10), and the case is packed with acrylic material, closed, pressed, and cured, either by boiling or vulcanizing according to individual preference.

13. Upon removal from the flask the splint is trimmed and polished. Care must be exercised in trimming the small projections that go into the in-

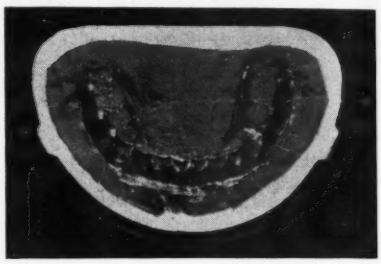


Fig. 10—Model in lower half of flask tin-foiled before case is packed with acrylic material, closed, pressed, and cured.

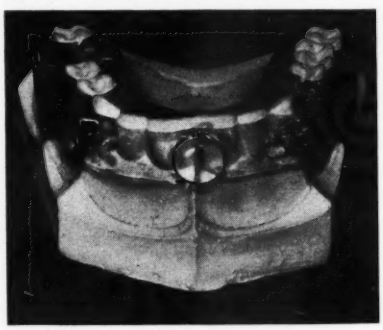


Fig. 11

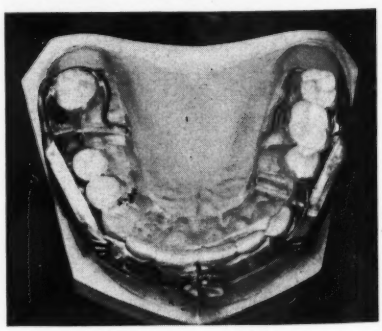


Fig. 12

Figs. 11 and 12—Two small gauge tubes soldered parallel to each other used to make extension arms in cases in which bulk of large gauge material might be objectionable.

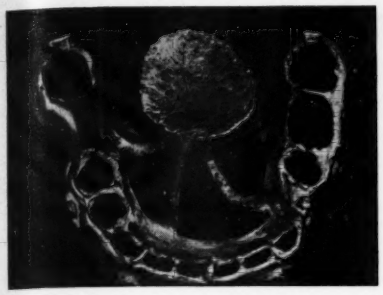


Fig. 13—Cast silver splint just after removal from investment and before sprues have been cut off.

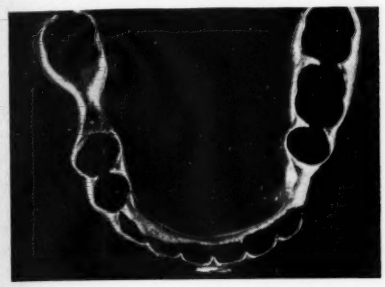


Fig 14—Silver splint polished but buccal segment has not yet been divided at median line, nor have cuts been made through edentulous area.

terproximal spaces. If too much material is removed in careless trimming, the grip of the splint on the teeth will be impaired and the efficiency of the appliance reduced.

14. The buccal segment is cut into two sections through the median line, and any edentulous areas are cut through from mesial to distal.

15. The splint is fitted on the model and any necessary minor adjustments are made, so that it will go into place perfectly.

Construction of Attachments to Splints

The foregoing description has been for the construction of the simple basic splint. Often it is necessary to use extension arms, either intra-oral or extra-oral to immobilize a fracture effectively. If these attachments are to be used, sections of square tubing are built into the splint and the extension arms are made of square wire which fit snugly into the tubing.

1. When the hinge wires have been adapted, a section of tubing is cut to the desired length and placed in position on the cast (Fig. 5). Usually the tubing is placed on the buccal surfaces of the molar teeth to lie parallel with the occlusal surfaces, although the position may vary.

2. The tubing can be soldered to the hinge clasp wire in most cases and will be held in place during packing and curing along with the hinge, the ends of which are made especially long in order that they may be embedded in the investment. In some cases the tubing may be placed in such position that it cannot be soldered to the hinge wires. If this is true the tubing is waxed to the cast in the desired position, a wire is inserted into it and extended a sufficient distance so that its ends will be embedded in the investment when the case is flasked (Fig. 8). By this method the wire is held stationary and the tubing is like a sleeve on the wire. As the tubing fits the wire accurately there is enough frictional retention to hold the tubing in its proper position on the wire.

3. Wax is then applied, and the case is carried to completion exactly the same as the basic splint heretofore described.

Nickel-silver square tubing and wire to fit are ordinarily used in making these extension arms. For short intra-oral arms the tubing is 10 by 14 gauge and the wire is 14 gauge. Extra-oral extension arms and rhinoplastic scaffolding, because of their greater length, must be made of a more rigid material. Greater rigidity may obviously be obtained by using tubing and wire of a larger gauge.

Another method, and sometimes a more desirable one, is to solder two small gauge tubes parallel to each other as shown in Figs. 11 and 12. This is indicated in cases in which additional bulk of large gauge material might be an objection.

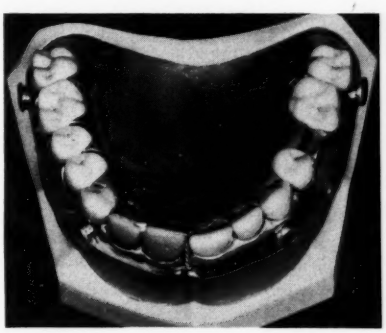


Fig. 15

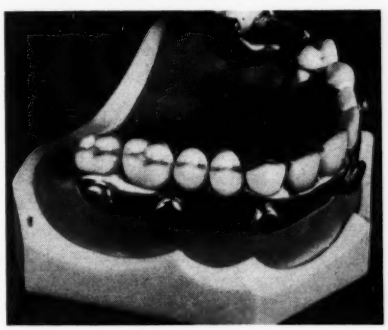


Fig. 16

Figs. 15 and 16—Small, flat undercut buttons waxed into buccal surface of splint at intervals, around which elastic bands are hooked and carried around loops of intramaxillary multiple loop wiring on opposite jaw for intermaxillary elastic traction. The buttons may also serve as attachments for extra-oral traction.

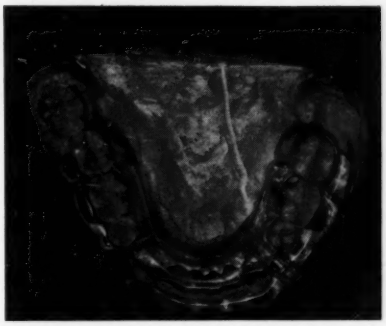


Fig. 17—Splint comprised of buccal and lingual segments with one hinge.

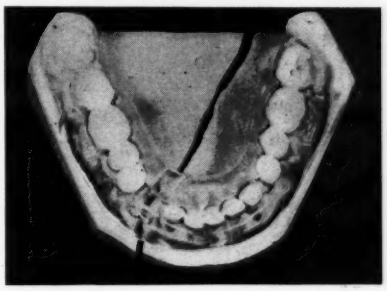


Fig. 18—Simplest sectional splint: buccal and lingual segments without connectors or hinges.

Modification of Technique for Vulcanite Splint

The construction of a vulcanite splint is identical to that of the acrylic in every detail except that it is not necessary to tin-foil the case if vulcanite is used.

Modifications of Technique for Silver Splint

If the appliance is to be cast in silver there are a few differences but in general the process is the same.

The metal used in casting these splints is pure silver to which 10 per cent of copper is added.

1. A silver splint is cast directly to the model, so that the working metal is poured in investment instead of stone.

Fig. 19—Splint shown in Fig. 18 in place in the mouth.

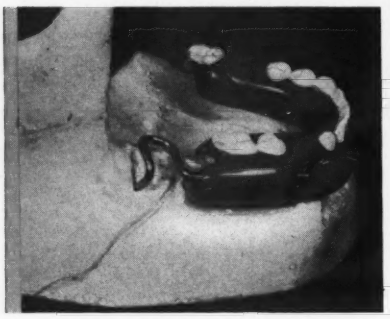


Fig. 20

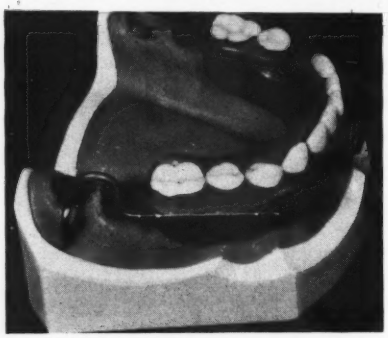


Fig. 21

Figs. 20 and 21—Sectional splint having an intra-oral extension arm, used to control edentulous fragment.

Fig. 22

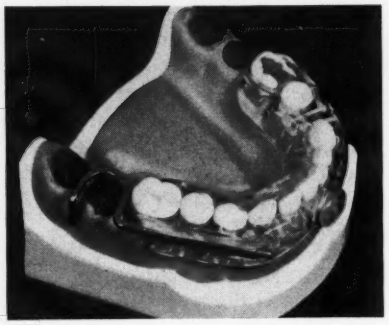


Fig. 23

Figs. 22 and 23—Same splint constructed with one of the clear acrylic resins.

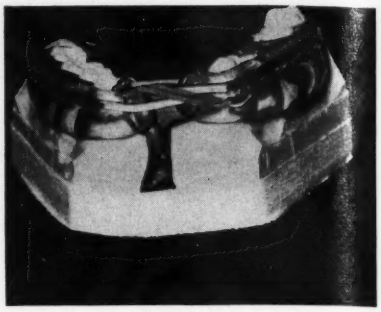


Fig. 24

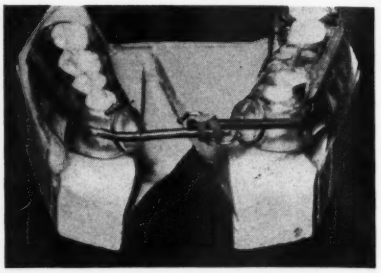


Fig. 25

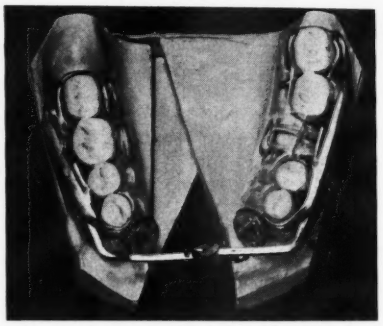


Fig. 26

Figs. 24, 25, and 26—Appliance used to produce expansion in cases of extensive loss of tissue and collapse of fragments.

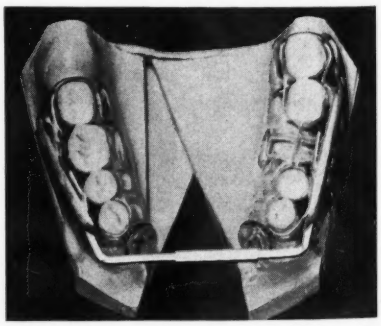


Fig. 27—Square tubing slipped over arms and covering joint in appliance shown in Figs. 24, 25, and 26, used to hold parts in respective positions.

splint just after removal from the investment and before the sprues have been cut off. Fig. 14 shows a silver splint polished but the buccal segment has not yet been divided at the median line, nor have the cuts been made through the edentulous areas.

The main advantage of the silver splint is greater rigidity with less bulk.

Variations for Adaptability of Splint

1. *Cases Requiring Intermaxillary Elastic Traction*—In some cases in which a sectional splint is supplied it may be advisable to establish intermaxillary elastic traction as well. When the splint is constructed, several small, flat, undercut buttons may be waxed into the buccal surface at intervals (Figs. 15 and 16). Elastic bands can then be hooked around these buttons, the opposite ends being carried around the loops of intramaxillary multiple loop wiring on the opposite jaw. These buttons may also serve as the attachment for extra-oral traction. The splint provides the maximum anchorage with broad base that can be obtained in one arch.

2. *Both Bicuspids Missing: Buccal and Lingual Segments with One Hinge Wire*—A simple variation of the three-piece sectional splint is the one shown in Fig. 17. This appliance consists of a buccal segment and a lingual segment with only one hinge

2. The hinge wires and tubing are adapted and held in position in exactly the same manner as in the other types of splints.

3. The waxing is the same except that two thicknesses of 28 gauge casting wax are sufficient.

4. The placing of sprues, investing, wax elimination and casting are the same as for any large one-piece casting.

5. The molten silver flows around the hinge wires in the same way that the vulcanite or acrylic materials do. If the silver fails to form a perfect union with the hinge wires the defect can easily be remedied by the application of a little gold or silver solder. Fig. 13 shows a cast silver

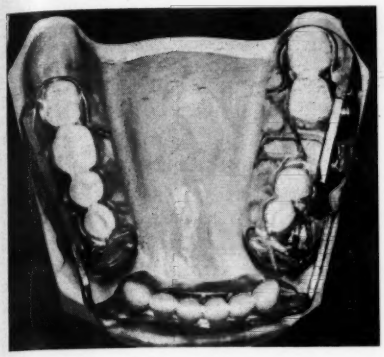


Fig. 28

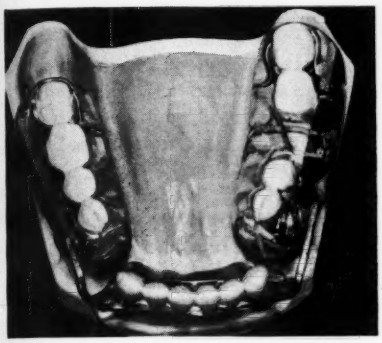


Fig. 29

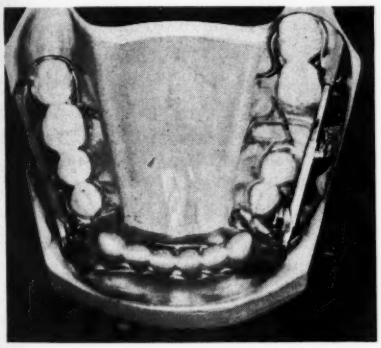


Fig. 30

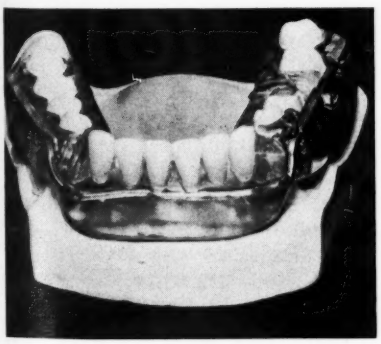


Fig. 31

Figs. 28, 29, 30, and 31—Elaborate variation of splint shown in Figs. 24, 25, 26, 27, used for maintaining expansion and permitting restoration of missing teeth.

wire. The first bicuspids are both missing, thus the splint material filling these areas must be split to permit the appliance to be opened. Two parallel holes are drilled through the splint from buccal to lingual in each of these spaces. Brass wires passed through these holes and tightened hold the two segments of the splint firmly in place and produce a firm grip on the teeth.

3. *Simple Fractures and Delayed Unions: Splint without Hinges*—In Fig. 18 is shown the sectional splint in its simplest form. It consists of a buccal segment and a lingual segment with no wire connectors or hinges. The lower right cuspid which was in the line of fracture has been removed.

When the splint is waxed, this edentulous area is filled in solid as was done in the splints previously described. After curing and polishing, this portion is cut mesio-distally thus dividing the splint into two sections. Parallel holes are drilled through the cuspid area, and brass wire, passed through them and tightened, holds the teeth firmly between the two parts of the splint.

This variation is useful in simple fractures or in cases of delayed union where retention and stabilization are desired during the final stages of consolidation. Increased function during this period is an advantage and is by this method provided. Fig. 19 shows an appliance of this type in place in the mouth.

4. *Mandibular Fracture with Edentulous Posterior Fragment: Splint with Intra-Oral Extension Arm*—Often fractures of the mandible are sustained in which there is an edentulous posterior fragment. Cases of this type are sometimes difficult to control because of the tendency of the edentulous fragment to be displaced upward and outward owing to the pull of the muscles attached to it. A satisfactory method of control in these cases is the use of a sectional splint with an intra-oral extension arm as illustrated in Figs. 20 and 21.

This appliance is a simple three-section vulcanite splint with the extension arm attached. When the splint is applied the fracture is reduced and the arm adjusted so that it will hold the posterior fragment down in its proper position. The terminal end of the extension arm is a sharp point which pierces the soft tissue and rests directly on the bony surface of the external oblique line.

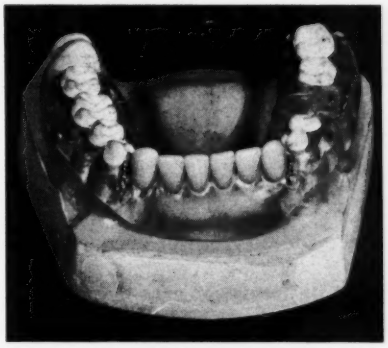


Fig. 32

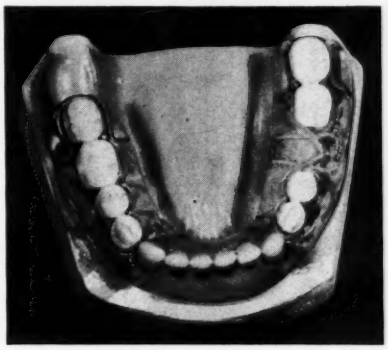


Fig. 33

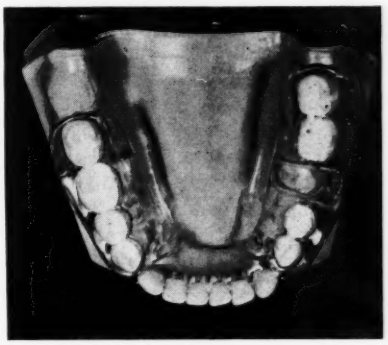


Fig. 34

Figs. 32, 33, and 34—Simpler splint for maintaining expansion and permitting restoration of missing teeth.

Figs. 22 and 23 show the same splint constructed with one of the clear acrylic resins.

5. *Appliance Applicable in Extensive Loss of Tissue and Collapse of Fragments*—Another type of case is that in which there has been extensive loss of tissue and collapse of the fragments. An appliance that will produce expansion is necessary, and a highly satisfactory one is that pictured in Figs. 24, 25 and 26.

As will be seen, the appliance consists of two separate unilateral sectional splints, each having a section of square tubing into which intra-oral extension arms are inserted. Each of these splints consists of a buccal and a lingual section hinged together posteriorly to the last tooth, and with a split undercut button at the open end. It will be noted that the buttons have been placed a little toward the lingual so as not to interfere with the extension arms. A brass wire looped and tightened around each undercut button attaches the splint firmly to the teeth. Elastic bands placed around hooks on the ends of each extension arm produce the necessary traction for expansion. When the proper amount of expansion has been obtained the fragments must be held firmly in the expanded position until consolidation takes place or until necessary bone grafting has been done. The square wire extension arms are cut off so that the ends are exactly in apposition. A piece of square tubing slipped over the arms and covering the joint, as illustrated in Fig. 27, will hold the parts in their respective positions.

6. *Missing Anterior Teeth: Elaboration of Splint Variation* 5—Figs. 28 29, 30, and 31 show a more elaborate variation of the splint mentioned under 5, in which the missing anterior teeth are restored. The individual sectional splints on each side of the mouth are the same as the ones just described except that there is no undercut button at the open end. Instead, parallel holes have been drilled through the splint material from buccal to lingual immediately anterior to the first bicuspids, and brass wires passed through the holes and tightened hold the splints in place. An additional wire through the edentulous first molar area increases the grip of the splint on the teeth. The extension arm is a single unit, and to its anterior portion vulcanite teeth are attached with acrylic resin, thus the lost natural teeth and tissues are restored.

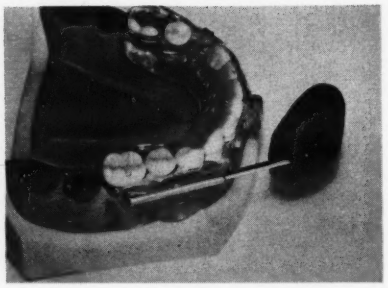


Fig. 35

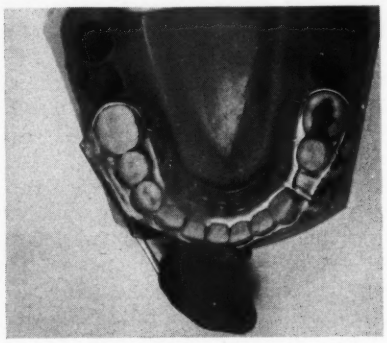


Fig. 36

Figs. 35 and 36 — Modeling compound stent, supported by intra-oral extension arm attached to basic splint.

7. *Simpler Splint for Maintaining Expansion and Permitting Restoration of Missing Teeth*—A simpler splint for maintaining expansion and permitting the restoration of missing teeth is shown in Figs. 32, 33, and 34. In this appliance there are no tubes or extension arms. The area from cuspid to cuspid is solid and continuous with the buccal segment, the porcelain teeth being attached to this portion. The lingual part of the splint is divided into sections by cuts which are made just mesially to the first bicuspids. This permits the appliance to be opened for insertion or removal by swinging the lingual segments inward on each side. Parallel holes are drilled through the splint material from buccal to lingual just mesially to the first bicuspids. Brass wires passed through these holes in the usual manner when the splint is closed secure the lingual sections to the buccal segment and produce the necessary grip on the teeth.

8. *Operative Use of a Stent*—Certain operations, such as the making of dermal grafts, deepening of the buccal sulcus, or lowering muscle attachments will require the use of a stent. Figs. 35 and 36 show a modeling compound stent, supported by an intra-oral extension arm which, in turn, is attached to the simple, three-piece, basic sectional splint.

Army Dental School,
Army Medical Center,
Washington, D. C.

Announcement of Books Received

ORIENTATION IN AMERICAN DENTISTRY: Its History and Social-Professional Background (A Text-Workbook for Dental Students and Professional Health Workers), By Alfred J. Asgis, Sc.B., M.A., D.D.S., Ph.D., New York, Clinical Press, 1941.

PRESCRIPTION WRITING AND FORMULARY FOR DENTISTS: By L. Richard Cipes, Ph.G., D.D.S., Brooklyn, New York, Dental Items of Interest Publishing Co., Inc., 1941.

ORAL PATHOLOGY: A Histological, Roentgenological, and Clinical Study of the Diseases of the Teeth, Jaws, and Mouth (With 1370 Illustrations including 137 in color), By Kurt H. Thoma, D.M.D., St. Louis, The C. V. Mosby Company, 1941.

BROADWAY STOMACH, By Joseph F. Montague, M. D., New York, Simon and Schuster, 1940.

Unilateral Subluxation of the Mandible

MORVEN CURRAN, D.D.S., Kansas City, Missouri

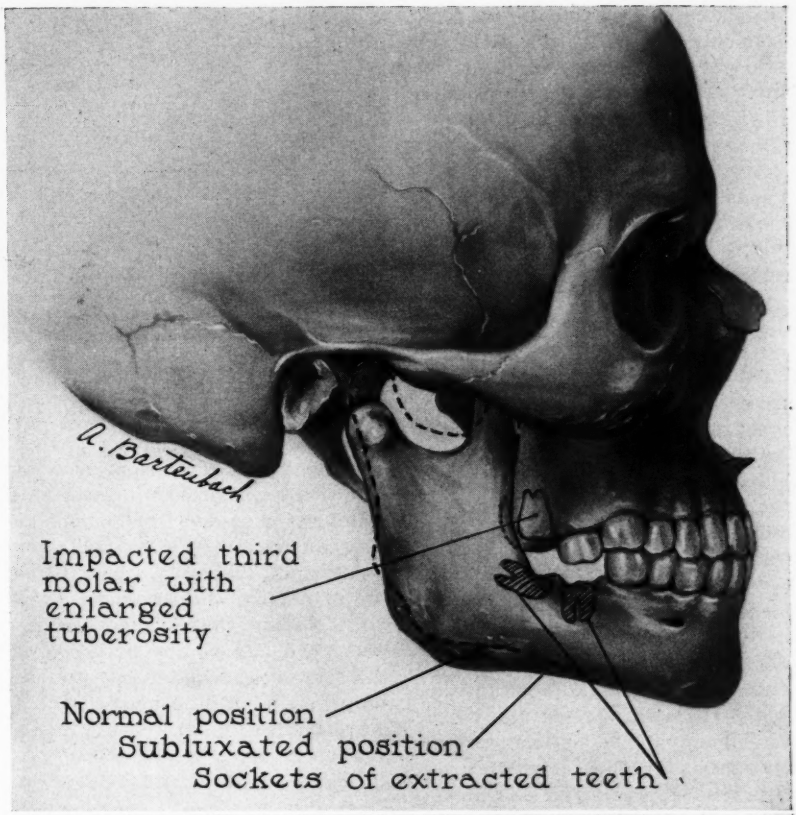
DIGEST

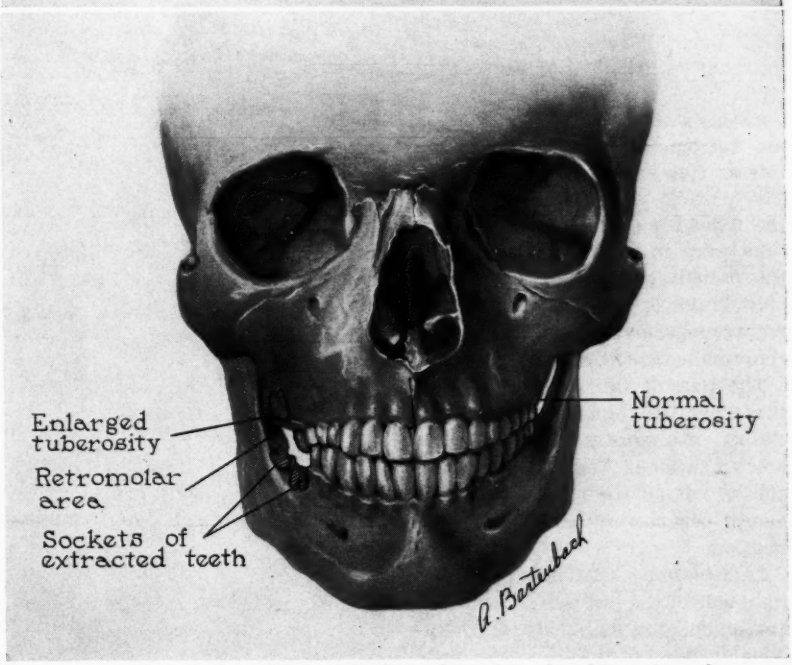
Subluxation may be unilateral or bilateral and is defined as an incomplete dislocation of the condyle accompained by partial dysfunction in distinction to complete dislocation or displacement with complete dysfunction. Methods of treatment are mentioned.

A report is given of a case of unilateral subluxation, including its detection, diagnosis, treatment, and postoperative course.

SUBLUXATION OF THE mandible is defined as an incomplete luxation or dislocation. The term dislocation usually refers to a greater displacement of the condyle accompanied by complete dysfunction. Whereas dislocation of the mandible has been reviewed thoroughly in the dental literature, less has been written about subluxation. Most references to subluxation have to do with the "clicking" or "snapping" jaw caused by the decrease of tension of the condylar ligaments which permits too free excursion of the condyle upon opening of the mandible. Many nonsurgical and surgical treatments have been suggested for this condition. Immobilization of the mandible is the primary thought in most of the treatments, with head and chin bandages and intra-oral wiring utilized as in a fracture. Surgical treatment consists mainly in transplanting a segment of the temporal fascia to the condyle, or in the complete removal of the meniscus from the joint. Generally these methods were unsatisfactory until Louis W. Schultz, Jr.[1] of Chicago in 1937 brought forward the injection treatment with sodium psylliate. By this method a dense fi-

[1]Shultz, L. W., Jr.: Treatment by Injection for Subluxation of the Temporomandibular Joint, Dental Digest, 43:423 (September) 1937. A Treatment for Subluxation of the Temporomandibular Joint, J. A. M. A. 109: 1032 (September 25) 1937.





Figs. 1 (top) and 2—Oral conditions and relationships of jaw found in patient whose case history is described in text.

brous capsule is formed around the head of the condyle which limits the extent of opening of the mandible and thus eliminates the clicking and discomfort and restores the joint to function.

Subluxation usually results from trauma or a strain on the condylar ligaments as a result of a blow; undue pressure in the removal of an impacted lower tooth; improper use of a mouth prop during a general anesthetic; or a bite that is progressively closing. There are other causes, and among them arthritis deformans should be considered. Subluxation resulting from the causes mentioned is usually bilateral.

Report of a Case of Unilateral Subluxation

History—Miss J. V., aged 19, presented herself August 26, 1939 for the extraction of a horizontally impacted lower right third molar (Fig. 1). Three weeks previously the patient had had the lower right second molar removed by her dentist to alleviate the pain in the lower right side of the jaw. The pain had been mildly present at least a year before consulting her dentist.

The lower right impacted third molar was extracted without any difficulty. Three days later the sutures were removed. The patient was not seen until ten months later when she returned complaining of pain in the lower right retromolar area and the right mandibular joint. The patient said that her friends had been teasing her about her crooked jaw.

An intra-oral roentgenogram of the retromolar area and a right lateral view of the jaw was taken. The patient was advised to return the following day. The teeth at this time were in perfect occlusion and the patient gave no history of any blow, fall, or other injury. These roentgenograms did not reveal any abnormal conditions.

The patient did not return until three months later when she complained of a more severe pain in the areas mentioned. The patient was unable to eat on the right side of her mouth because of the pain of mastication.

Examination — Drooping of the right side of the jaw was pronounced, and on opening the mouth, the mandible deviated distinctly to the right. The patient was not conscious of any "clicking" or "snapping" with any movement of the jaw, but complained of a slight pain at the right mandibular joint on pressure. Intra-oral examination showed the patient to have an exceedingly low and long upper right tuberosity which fitted snugly against the retromolar area when the jaw closed. There was no visual evidence of any irritation to the retromolar area, although the tuberosity seemed to make a slight depression in the retromolar tissues. The upper right second molar was elongated and deviated buccally. The tuberosity in the left maxilla was of normal size (Fig. 2).

Fig. 3—Note appearance of crooked jaw and lack of symmetry in facial contour.

Roentgenographic Observations—Intra-oral as well as lateral, posterior-anterior, and condyle roentgenograms were taken. The condyle roentgenograms were obtained on both sides with the mouth in a closed and open position. They showed the left condyle to be normal but the right roentgenogram showed the right condyle to be out of position on closure. There was a space of at least 4 mm. between the head of the condyle and the glenoid fossa. An intra-oral roentgenogram revealed the presence of an upper right impacted third molar. Because of the wide opening of the mandible, ankylosis was ruled out even though the mandible deviated to the right. The possibility of an arthritic

Fig. 4—Note how jaw deviates decidedly to the right in open position.

joint or a fracture of the mandible was also eliminated from the diagnosis.

Diagnosis—A diagnosis was made of a mechanical unilateral subluxation of the right mandible due to an impacted upper right third molar, and an enlarged tuberosity. The tuberosity acted as a fulcrum, pulling the right condyle out of position on closure of the mandible.

Treatment—Under local anesthesia the upper right impacted third molar was extracted and the tuberosity trimmed so as to allow a space of one-third inch to intervene between the tuberosity and the retromolar area. Three days later the sutures were removed and the jaw was found to have settled, so that there was space for only a few millimeters between the upper and lower jaw. Because of the complaint that the upper right second molar was irritating the lower tissue, and as there was no opposing tooth, the upper right second molar was extracted.

Course—As a result of the extraction of the upper right second and third molars and the trimming of the right tuberosity, complete relief of pain was experienced. The esthetics of the face was improved with the improved appearance of the crooked jaw. Whether the normal contour of the face will ever be restored completely without orthodontic intervention is problematical. As this abnormal condition has been developing for at least two years, the teeth in the right upper and lower arches have been slowly elongating. Roentgenographic examinations show that the right condyle is gradually regaining its normal position.

906 *Waldheim Building.*

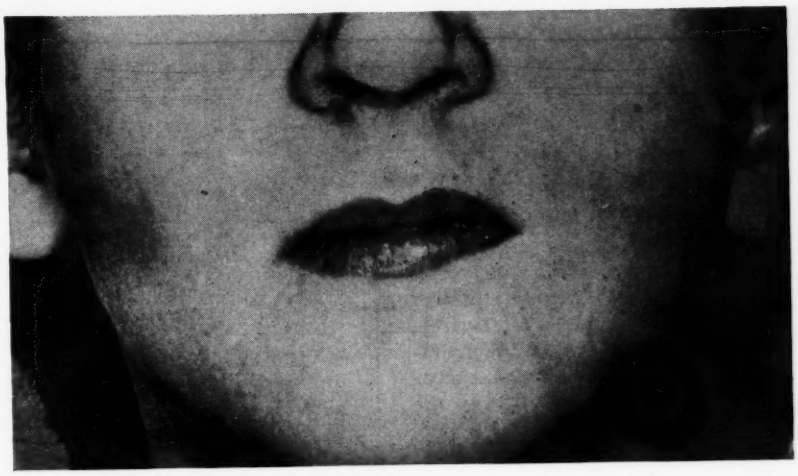


Fig. 5

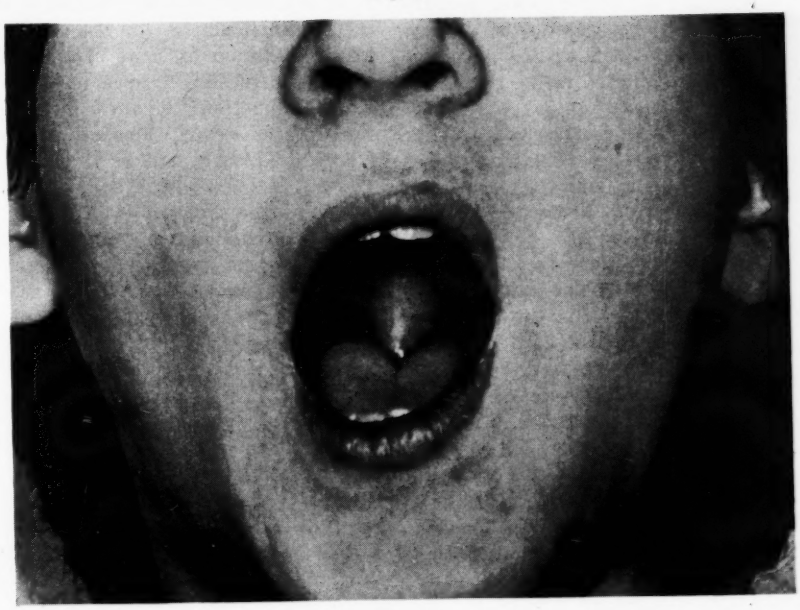


Fig. 6

Figs. 5 and 6—Three weeks after operation. Although the face still lacks symmetry, appearance has been improved. Upon opening, jaw does not deviate so much to the right as previously. It is doubtful whether complete facial contour will be restored without orthodontic intervention.

UNSOLICITED MANUSCRIPTS

FROM TIME TO time THE DENTAL DIGEST receives inquiries regarding its attitude toward unsolicited manuscripts. These are especially welcome. There are many excellent dentists who have improved or modified a technique or have refined an operation; but these men do not contribute to the literature because they are afraid they do not know how to "write." Dentists are not expected to be "writers." If they will tell their stories in a straightforward manner, the editors will be happy to cooperate with them in presenting their material. Unsolicited manuscripts sent to THE DENTAL DIGEST are read with care and open-mindedness and are reported on promptly.

Acrylic Jacket Crown Construction

HARRY A. KANNIS, A.B., D.D.S., Reading, Pennsylvania

DIGEST

A technique is suggested whereby exactness in shade is insured when constructing acrylic jacket crowns with supply kit materials and stock acrylic teeth.

ARTIFICIAL PORCELAIN teeth of a crude type were first introduced in France in 1815. Improvements in this type of tooth progressed, largely through the efforts of American research, until White, in 1844 began the manufacture of porcelain teeth on a commercial basis. Since that time the dental profession has used only porcelain teeth in denture construction until the last year.

With the use of the newer denture materials, there was opened a new phase in dentistry with wide possibilities. Instead of using rubber or bakelite as denture bases, the dental profession began using the acrylics as a denture base. Still more novel and fascinating was the advent of teeth made from a plastic, namely, acrylic resin.

Most of the profession have had occasion to see the new jacket crowns made of acrylic, either by the commercial laboratory or at the various conventions, where kits were offered for sale on the open market, so that the dentist might make a jacket crown in his own office. I have used such a kit and have found it excellent except for some difficulty in getting the desired shade. The following technique was developed, therefore, in order to insure exactness in shade. The kit is used as bought in the regular supply houses, supplemented by the acrylic teeth which may also be bought at the supply counter.

Technique

1. The tooth is cut down, as for any jacket crown preparation, preferably with a shoulder to give a nice clear-cut finishing edge. The preparation may, however, be prepared without a shoulder and still the crowns will stand up well.

2. The impressions are taken in the usual manner, and a die is made from the usual compound band impression. I have been using amalgam dies exclusively in practical cases but I also have used kryptex with good results in trial cases. When time is a factor, kryptex may be used to good advantage.

3. Up to this point the technique is exactly like that for porcelain construction. After the die is seated and the case articulated, the die is then foiled. Platinum foil may be used in this technique but I have not used platinum, because it offers no advantages whatever. Thin gauge tin foil is used, .001 inch in thickness. The die is foiled with a small apron left above the shoulder (Fig. 2).

4. An acrylic tooth, one that is used in denture construction, is selected for width, shade, and length, and ground at the neck to fit the shoulder; the lingual is thinned out to a wafer for close adaptation to the die (Fig. 6). This is a quick operation, as the acrylic tooth cuts rapidly with burs. It may be done with the dental handpiece, although I prefer to use a bench lathe.

5. The wafer that is left of the acrylic tooth is then waxed and shaped from the lingual only, inasmuch as the labial is taken care of by the acrylic tooth which was cut down. It is preferable to use pink baseplate wax rather than the regular casting waxes, because of the intensity of the pigments, which are absorbed by the mold in flasking.

6. This wax form is now removed from the die and invested in a good grade of dental stone.

7. The kit referred to is supplied with a flask, and the wax form is invested in this flask, the lower half of the flask being used. The labial side of the tooth is covered as far as the incisal edge of the tooth, so that it will stay in this half of the flask (Fig. 8).

8. When set, the lower half of the flask is foiled with either thin tin foil or heavy gauge foil with the same end-result. Foiling this half of the flask facilitates finishing the crown after it is processed.

9. The second half of the flask is applied and poured with either stone or laboratory plaster, whichever is closest to the bench at the time. Any expansion or contraction from this side will have no effect on the crown at all.

10. When the second half of the case is set, it is boiled out in the usual manner as for a denture, leaving it in boiling water for five minutes, and then opening it. The acrylic tooth is left in the bottom half of the flask adjacent to the tinned stone base in the first half (Fig. 11).

11. The case is allowed to cool after all the wax has been removed.

Fig. 1

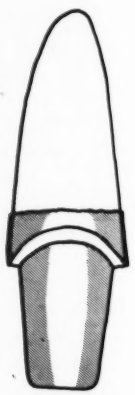


Fig. 2

Fig. 1—Amalgam or kryptex die.

Fig. 2—Die foiled with .001 tin foil or platinum foil.

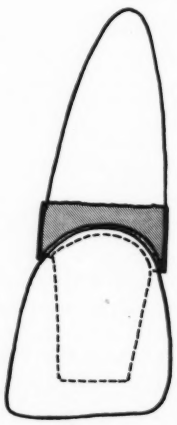


Fig. 3

Fig. 4

Fig. 3—Acrylic tooth cut down to fit foiled die.

Fig. 4—Side view of amalgam die, tinfoiled.

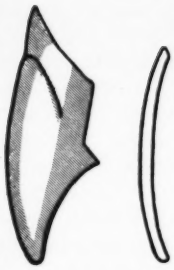


Fig. 5 Fig. 6

Fig. 5—Side view of acrylic tooth.
Fig. 6—Side view of acrylic tooth cut down to fit the die.

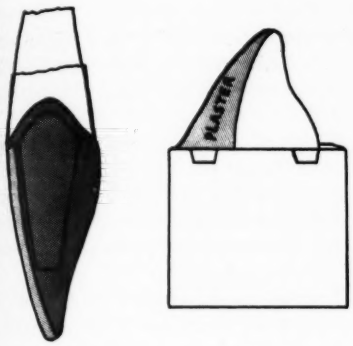


Fig. 7 Fig. 8

Fig. 7—Die waxed on the lingual, showing acrylic tooth in position.
Fig. 8—Lower half of flask showing acrylic tooth held in position with stone or plaster.

12. The proper shade of acrylic is selected, mixed to a fluid consistency, and packed into the mold. The two halves are put together, placed in a press, and carefully closed. The case is test-packed and the excess removed.

13. The two halves are again put together, placed into a clamp, and boiled in water for one hour, when the whole is removed and cooled under running tap water for about fifteen minutes. The case is ready to be opened.

14. After the plaster and stone are cleaned away, the crown is rather clean because of the tin foil. This foil is removed, and the crown should almost fit the die, having a little excess around the neck which is easily trimmed away with vulcanite burs. Other than that, there is little finishing to be done. The acrylic backing up the facing has a polished surface as a result of the foiling and may necessitate buffing with pumice and whiting.

Advantages

1. For the operator who is not too well skilled in carving and shaping teeth, the technique outlined here is useful inasmuch as the acrylic teeth used on the labial and buccal already have the desired shape.

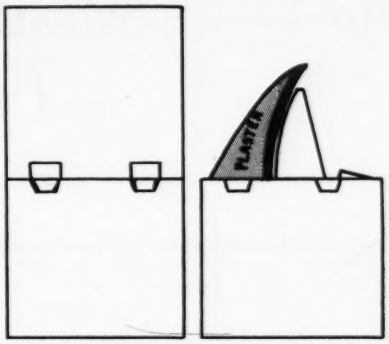


Fig. 9 Fig. 10

Fig. 9—Top half of flask in position and poured.
Fig. 10—Lower half of flask boiled out and ready to be packed with acrylic material.

2. The shade is always insured.

3. No expensive electric furnaces are needed, and a special room and equipment are not essential.

4. The crown when finished and inserted is stronger than porcelain, and the opposing teeth are less shocked than when striking against porcelain.

5. An inexpensive crown can be made, and the same technique lends itself well to fixed bridges.

6. For those who are making porcelain veneer crowns, this technique is simpler and the results are more gratifying.

141 *North Fifth Street.*

Suggested Technique for Understanding Another Person's Point of View*

[*From the Proceedings Seventh Institute of Public Health Education, A.P.H.A., Detroit, October, 1940. Bulletin, American Association of Public Health Dentists, 1:17 (April) 1941.]

"I. Preparation

A. Begin by emptying your mind of all

1. Pride in your own knowledge. power, or point of view.
2. Conviction that you know the whole truth.
3. Irritation at the peculiar mode of approach, method of thinking, vocabulary, mannerisms, of the other fellow.
4. Resentment (hardest of all) at his assumption of superiority, certainty that he knows the truth.

B. 1. Become an impersonal, impartial scientific seeker after truth.

2. Be filled with curiosity to explore the other fellow's mind.

3. Try to enter so completely into the other person's mind that for the time being you think and feel as he does. You must 'become' the other fellow.

"II. Procedure

A. Ask the person to state or explain his views.

B. Analyze them into elements and locate points of conflict with your own.

C. Ask questions about points not understood. Use the form, 'I don't understand what you mean by . . . . Please amplify or restate it, or give an illustration.'

D. Conceal your own views. Don't use the words, 'I think,' 'I feel,' 'I believe,' 'It seems to me.' Inquire, 'What do you think about . . . ?' Present your evidence or views entirely in the form of questions that will reveal his thoughts, reasons and attitudes, not your own.

E. Don't put words in his mouth. Don't use the form, 'Don't you think?' Instead say, 'What do you think about . . . ?'

"III. Testing

When you are sure you understand his views, say, "Then you believe so and so for such and such reason.'

If he replies. 'Yes, that's right,' count yourself successful. If he says, 'Yes, but . . . ' or 'not exactly,' or gives evidence of distress at your phrasing and attempts to qualify it, you have failed and need to begin all over again."

Weather, Dental Extraction, and Bacterial Localization*

WILLIAM F. PETERSEN, M.D., Chicago

DIGEST

Three exemplifying common case histories are reviewed in which infection of the endocardium followed dental extraction and made evident that not only must the bacteremia frequently associated with such operative intervention be considered but also that the condition of the patient in the framework of the environment of the time must be recognized.

If the endothelium of the heart valves has been subjected to unusual strain because of preceding or coincident periods of high blood pressure, this endothelium may be stimulated or fatigued. Under such conditions localization of bacteria is facilitated.

Periods of high blood pressure usually occur with the passage of cold air masses,[1] but other factors, such as trauma, infection, emotional upsets, may at times be associated with similar reactions, and all of them are particularly effective in the late winter and in the spring.

The extraction of infected teeth or the extraction of teeth in persons giving a history of frequent sore throat and of rheumatism presents certain clinical hazards that should be fully recognized, especially in the young or in those in whom an old valvular disease on a rheumatic basis is suspected.

In women, extraction should not be done premenstrually, if this precaution is possible.

In all patients extraction should, if possible, be avoided in the more unstable periods of the year, the late winter and early spring months.

If possible, extraction should be avoided during or immediately preceding periods of severe cold. If unavoidable, then certain precautions should be taken, such as would be called for in the preparation and after-care of any severe operative procedure. The patient should be kept completely at rest, preferably in bed, and not exposed to cold or exertion for at least ten days. It is possible that in severely infected cases in which these rules cannot be followed, the prophylactic use of modern chemotherapeutic agents, effective particularly in the domain of streptococcus infections, might present definite advantages.

At any rate, the ancient Hippocratic maxim that "cold is harmful to bone, teeth, and the spinal marrow" is just as valid today as it was 2400 years ago, and it may profit the patient if the dentist and the oral surgeon keep this precept in mind.

OF THE VARIOUS complications that may follow dental extraction, none is to be feared more than bacterial endocarditis. This is by no means an unusual complication, and for this reason it may be profitable to examine some of the underlying mechanisms. Two factors are prerequisite: the presence of viable bacteria in the blood stream; and the proper conditioning of leaflets of the heart valves so that the bacteria may localize and grow.

It is true that with every dental extraction, bacteria enter the blood stream in considerable numbers, but the mechanisms for their destruction are so perfect that usually no harm is done. The organisms are promptly filtered out into the lungs, the spleen, the bone marrow, the lymph glands where phagocytic cells destroy them. Sometimes their growth is merely checked, or they may be eliminated, as in the lungs or the superficial lymph nodes of the gastro-intestinal tract.

There is reason to believe that at certain times the bacteremia may be most extensive, or that many virulent organisms may gain admission to the blood stream without the production of cardiac infection.

Studies in experimental bacterial localization (Burrows[2]) have shown that localization occurs in regions where the endothelium of the vascular bed has become unduly adhesive. Such regions occur: (1) when the tissues are growing rapidly; (2) when the tissues and organs have been greatly stimulated or fatigued; (3) injured; (4) scarred; (5) have been subject to a preceding anoxia associated with vasoconstriction or vasodilatation; (6) sensitized; or finally (7) when they have been associated with some inflammatory change or some change due to intoxication.

It may be anticipated that the initiation of an infection of the heart valves will require some preceding change in the condition of the surface of the valves, a change in the adhesive qualities of the endothelial cells. It is well known that it is the contact surface of the valves that is usually the seat of the primary localization and that most of the lesions are on the mitral valves. The endothelial surface of these valves is in opposition and under pressure when

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[1]Petersen, W. F. and Milliken, M. E.: The Patient and the Weather, 1, part 2: Autonomic Integration, Ann Arbor, Michigan, Edwards Brothers, 1936; ibid. part 1, Cardio-Vascular-Renal Disease, ibid. 4, part 1, 1937.

[2]Burrows, H.: Some Factors in the Localization of Disease in the Body, London, Bailliere, Tindall and Cox, 1932.

the left ventricle contracts. Obviously the greater the force of contraction, the greater the systolic blood pressure, the greater the contact pressure. This means greater "work," greater functional activity of the endothelial cells, and with this, greater adhesiveness.

In a measure, every time the blood pressure increases rapidly or unduly, the delicate endothelium of the mitral cusps is subjected to physical trauma. Fig. 1 portrays the situation.

In the first diagram of Fig. 1, the blood flows from the auricle to the ventricle through the open leaflets, the pressure in the auricle being greater than that in the ventricle. In the second diagram, the pressure in the ventricle is somewhat greater and the valves touch. In the third diagram, the pressure in the ventricle is greatly increased (maximum systolic pressure) and the impact on the heart is so great, that at the point of contact the endothelium is under undue pressure and as the leaflets close, one impinges on the other. The endothelial cells become stickier, especially in young children or the cells of the valve that is the seat of an old rheumatic scar. When the bacteria have passed the lung filter and pass over the adhesive valve, only a few may adhere, but as they grow, endocarditis is established.

Inasmuch as the blood pressure, even in young persons, may vary greatly from day to day, depending on meteorologic conditions and other environmental factors, the metabolic status of the endothelial leaflets will vary accordingly.

Apart from the increased pressure as a result of periods when the person is subjected to cold, to exertion, to emotional disturbance, to trauma, to infection, endocrine rhythms are of importance; thus women reveal periods of greater permeability with the menstrual cycle; apparently unusual thyroid activity has the same effect, and in fatigue states in general, a similar situation is found. Of all these factors enumerated, climatic factors are probably the most important, and these involve, first, changes that occur day by day as the environmental temperature swings from cold to heat and from heat to cold; second, the summation of such episodes, as "seasonal" changes in which occurs particularly the fatigue associated with the late winter and early spring.

The experimental background for the mechanism has been presented by Nedzel.[3]

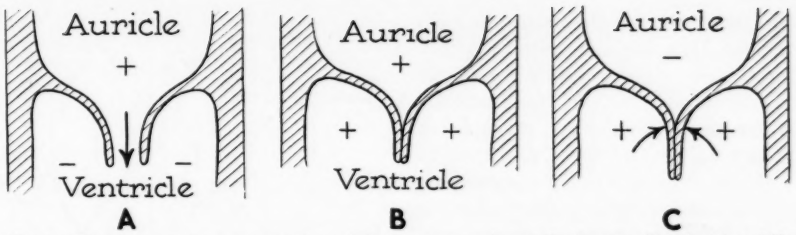

Fig. 1—Diagrammatic representation of the contact surfaces of a heart valve during: (A) diastole, (B) beginning of systole, and (C) maximal systolic contraction with pressure surfaces developed on endothelial contact surfaces of valves. Contact surfaces may under certain conditions become adhesive and facilitate bacterial localization.

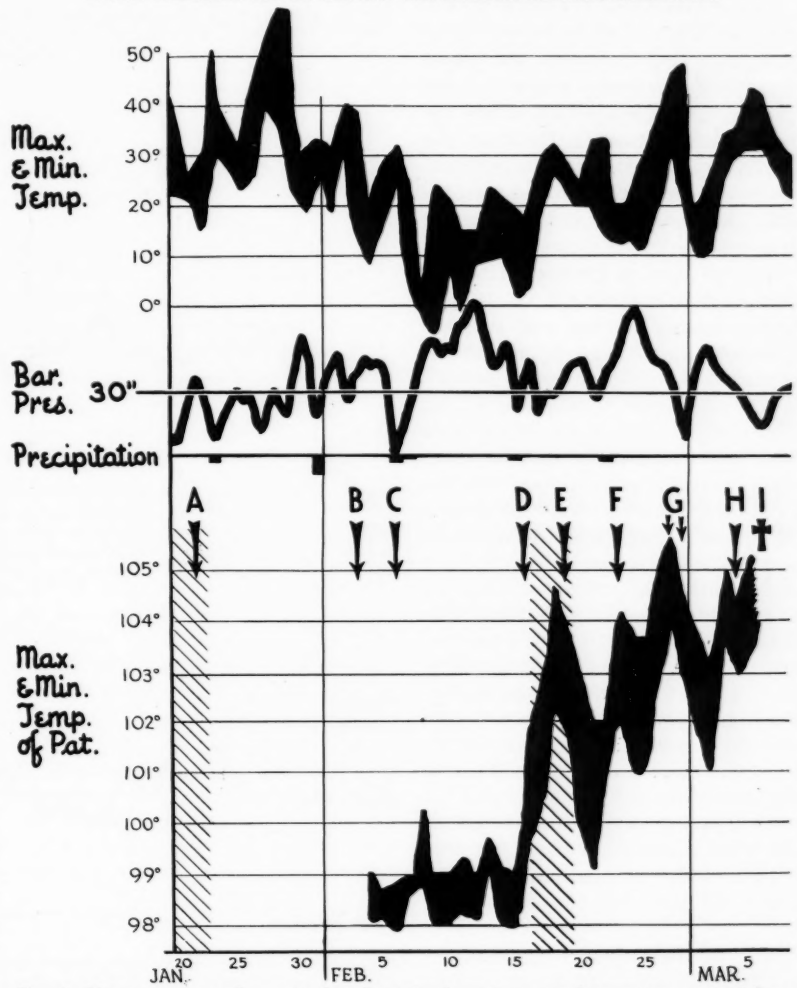

Fig. 2—Meteorogram with maximal and minimal environmental temperatures and barometric pressure for the period from January 20 to March 7. Below this the temperature curve of the Billings' patient described in the text is indicated. The cross-hatched vertical periods indicate the menstrual periods. A, Preceding menstrual period; B, hospital admission; C, tonsillectomy; D, dental extraction; E, diagnosis of pericarditis; F, erythema nodosum; G, abdomen, tympanitic; patient showed some improvement; H, stupor; I, death.

A Case Record from the Billings' Clinic

A case record taken from the Frank Billings' Clinic at a time when work in focal infection held the center of the stage will serve as an example.

The patient was a young white woman, aged 18, who entered the Presbyterian Hospital on February 3, 1914, with a diagnosis of arthritis de-

[3]Nedzel, A. J.: Experimental Endocarditis, Arch. Path. 24:143, 1937. Petersen, W. F. and Nedzel, A. J.: Dental Surgery and Endocarditis, J. A. D. A. 25: 1462 (September) 1938.

formans. The illness began in September, 1912, and had been progressing since that time, despite therapy of various kinds. The girl had had tonsilitis as well as other diseases of childhood; scarlet fever, and cholera when she was 12 years of age. The intern noted the "glossy skin" and the characteristic "clammy hands and feet," which revealed the underlying vascular disturbance.

It was found that the teeth were in bad condition, the tonsils were large and obviously infected, but apart from the anatomic change in the joints, the general examination revealed no abnormality. The heart was perfectly normal. Fig. 2 is a meteorogram on which the clinical episodes are designated by letters likewise used here in the text for reference.

On the sixth of February the tonsils were removed (Fig. 2, C). Despite the hesitancy of the oral surgeon, Doctor Billings insisted on the removal of a large number of infected teeth, and these were extracted on February 16 (Fig. 2, D). Up to this time the patient's temperature had been almost normal; now it was promptly elevated and this febrile course continued until the death of the patient (I). On February 19, a pericarditis was diagnosed (E); on the twenty-third, an erythema nodosum developed (F); on the twenty-seventh, the abdomen was tympanitic (G) and on the twenty-eighth the patient was very much better (G). By the fourth of March the patient was already stuporous (H), and she died on the sixth (I).

An autopsy was performed and a pancarditis found; that is, there was a pericarditis, an acute myocarditis, and a definite ulcerative endocarditis.

Why did this clinical outcome result? It will be noted on the graph (Fig. 2) that the teeth were extracted premenstrually[4] when the patient's vasomotor system had been unusually labile, with greater output of acidity, and with the endothelium more adhesive in general.

The unusually severe fall in environmental temperature to 0° F., with a repetition of this cold wave on the day before extraction, should likewise be observed. In other words,

[4]The record indicated that menstruation had occurred January 20 (cross-hatched on the graph, Fig. 2) and the patient was due to menstruate again on February 12, the day after the teeth were extracted.

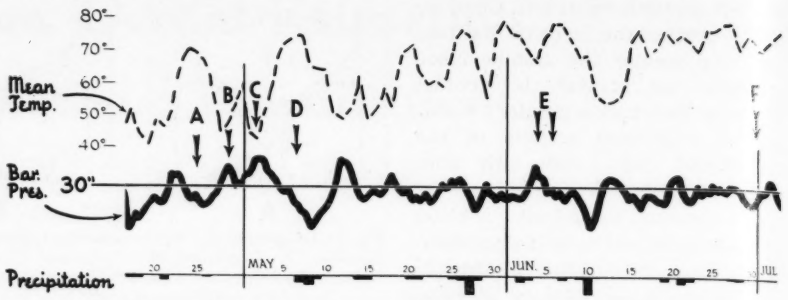

Fig. 3—Meteorogram illustrating onset of symptoms and extraction: (A) Onset of toothache; (B) dental extraction; (C) accentuation of symptomatology; (D) temporary improvement; (E) embolic process; (F) admission to the Research and Educational Hospital.

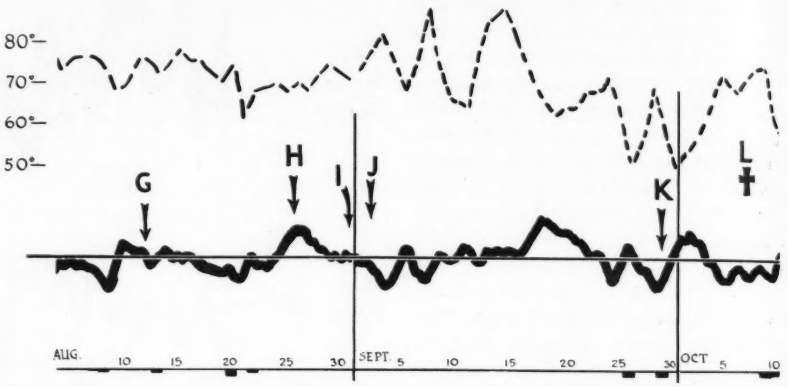

Fig. 4—Meteorogram illustrating later clinical events in same subject charted in Fig. 3: (G) Pain in left hand, arm, and side and swelling of left hand; (H) pulmonary embolism with cough during night and severe chill the next morning; (I) edema of eyes; (J) numbness of extremities with increased temperature on following day; (K) severe pain over cardiac region with dyspnea and considerable cyanosis; (L) death of patient.

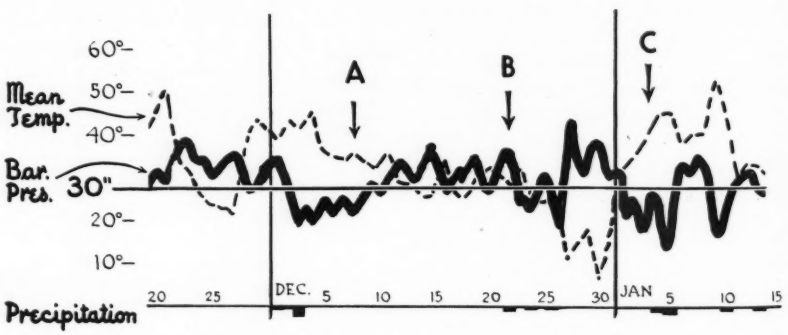

Fig. 5—Meteorogram illustrating clinical episodes in endocarditis patient (Research and Educational Hospital) with (A) extraction; (B) "cold," (C) definite onset of cardiac symptoms.

the blood pressure had been increased, the valves had been under harder contact pressure strain, the endothelium was particularly sticky, and now, with the flooding of the blood stream with bacteria when the teeth were extracted, localization was promptly initiated.

Two Recent Case Records

A white man, aged 35, was admitted to the Research and Educational Hospital on June 30, 1939 (Fig. 3, F). (The clinical episodes are again designated by circled numbers on the meteorogram, in the legends, and in the text proper when references to these episodes are made.)

The patient had been well until April 25, at which time he developed a toothache (Fig. 3, A). He had continuous pain for five days before consulting a dentist who decided to extract the tooth. This was done with

difficulty (Fig. 3, B). The patient was well for two days when he noticed a dull pain across the kidney region on both sides and also that he had a fever of 102° F. (C). The patient remained in bed for five days and then went back to work (D). During the course of the next five weeks, he noticed that he was losing weight and felt tired. At the end of this time, he consulted a physician, who found that the patient had a fever and that the urine contained albumin and pus.

While at work the patient noted that the toes of the left foot were swollen and painful and later this pain occurred instead in the left shoulder joint. For the first three weeks that he was under a physician's care, the temperature was around 101° F. in the afternoon. At the end of this time the temperature decreased somewhat and the patient was told that he could go out. This he did, but the next day, he developed a severe pain in the left calf (E). After that the patient was in bed, until his admission to the hospital (F).

An examination of these episodes as they are related to the weather at the time is revealing. The meteorogram (Fig. 3) with the lettered clinical episodes shows the barometric pressure (heavy black line), the mean temperature of the day (dashed line), the precipitation (black columns below the date line).

It is noted that the onset of pain (A) occurred when temperatures had suddenly increased. (With this sudden increase in temperature, tissues swell with consequent greater pain). Extraction occurred with the passage of a major cold wave, actually with a barometric crest (B).[5] Obviously, blood pressures must have been increased at this time in association with the passage of a cold air mass. With the succeeding cold wave (C) the infection was apparently well established and symptoms were accentuated. With warm weather, the patient felt better (D) and there was less strain on the heart. Then followed an embolic process early in summer (E). The embolic process occurred with a major barometric crest and a sharp decline in temperature. The physiologic adjustment necessary to the passage of this cold air mass and the greater demand on the heart, thereby associated, would be

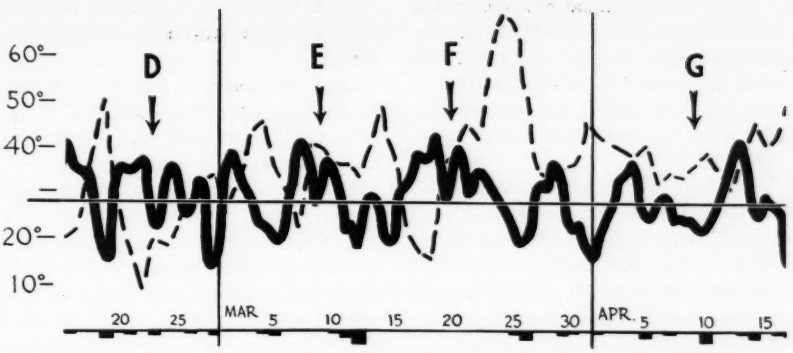

Fig. 6—Meteorogram illustrating events before admission to Research and Educational Hospital: (D) Accentuation of illness; (E) release from hospital; (F) readmission to hospital; (G) admission to Research and Educational Hospital.

reflected by detachment of an embolus. Activation of the process and a greater feeling of discomfort and malaise sent the patient to the hospital (F) — again during colder weather.

On admission a diagnosis of subacute bacterial endocarditis was made and the patient was given sulfanilamide without change in his general condition, his temperature varying from 99° F. to 101° F.

August 12, the patient complained of a pain in the left hand, arm, and side; the left hand was swollen (Fig. 4, G). On the nineteenth of the month a blood transfusion was given without reaction.

August 25, (H) the patient coughed considerably during the night and on the twenty-sixth he had a severe chill which lasted fifteen minutes. On the thirty-first there was some edema about the eyes (I) and perspiration was rather free on the first of September. September 2, the patient complained that his extremities were numb; he was drowsy and slept most of the time (J). The next day he was uncomfortable and the temperature rose to 102° F. This temperature persisted, together with a swelling of the face, for the following month. On the evening of September 28, the patient complained of severe pain over the heart region. During the night dyspnea was marked and there was considerable cyanosis (K).

He improved somewhat after this critical attack but became listless (L) on the morning of October 6, and died at 6:40 on the morning of the seventh.

At autopsy the clinical diagnosis was confirmed. There were small verrucous vegetations over the interventricular septum in the left ventricle and the mitral valve showed an irregular fibrous thickening and deformity. The valve leaflets were almost completely covered by grayish pink and green vegetations which sometimes attained a length of 2 cm. There were numerous infarcts in the spleen, in the lung, and in the kidney.

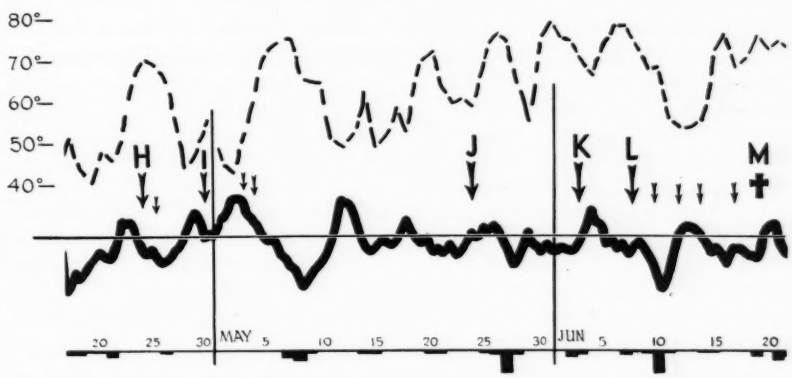

Fig. 7—Meteorogram illustrating (H) retinal embolus (corresponding with time of onset of toothache in preceding patient); (I) vascular disturbance; (J) chill; (K) and (L) onset of terminal clinical episodes; (M) death.

[5]Dentists have frequently observed that when extraction is followed by a sudden cold wave, clinical complications are more common.

These later clinical episodes reveal meteorologic changes (Fig. 4) of considerable significance. A barometric crest was observed on August 10 and this was followed by an embolic process with the next succeeding interface (G).

The next great barometric crest on the twenty-sixth was associated with a pulmonary embolus (H) and in the wake of this, several clinical episodes followed (I and J): Para-orbital edema and accentuation of vasomotor disturbance, cold, and numbness).

With the major meteorologic episodes of late September, the patient was again affected. The atmospheric interface of September 28 was followed by cardiac pain and dyspnea (K) and from that time on, the patient failed rapidly.

Another case which may be cited as an example is the following: A white woman, aged 27, was admitted (Fig. 6, G) to the Research and Educational Hospital April 9, 1939, with a history that she had been perfectly well until December 8, 1938, when she had a left upper third molar extracted (Fig. 5, A). The whole left side of her face was swollen and the cavity bled for a considerable time. A week later she went to work and developed a bad cold (Fig. 5, B) on December 22. She coughed a great deal, had an acute rhinitis, and could not eat well because of the local infection of her jaw, but she kept on working until (Fig. 5, C) January 2, 1939.

At this time the patient began to perspire a great deal, felt weak, and could do no work. In the morning the temperature was normal, but would rise in the afternoon to 102° F. About the third week in January the family physician was consulted and sulfanilamide was ordered. February 23: There was a slight pain fairly high on the left side of the chest (Fig. 6, D). The physician ordered hospitalization where blood cultures were made, but all were negative. The patient remained in the hospital approximately two weeks (Fig. 6, E), and then was home for eleven days. She became worse (Fig. 6, F) and returned to the hospital, and this time stayed approximately three weeks.

April 9, 1939: The patient entered the Research and Educational Hospital.

Here the onset is not so dramatic as in the preceding case, but it is, nevertheless, of sufficient interest to be reviewed: It is evident as seen in Fig. 5 that tooth extraction (A) occurred when barometric pressures were progressively rising and temperatures were falling, and during this time the patient developed a severe cold (B). The bacteria-laden alveolar cavity apparently did not heal rapidly and must have provided a constant nidus from which bacteria passed into the blood stream. The history indicated that streptococci were apparently harbored frequently. Under the circumstances, with colder weather, with the initiation of an acute rhinitis, it is more than probable that the blood pressure levels were at times high and the endothelial cells of the cusps were under greater contact pressure, thus "sensitizing" them and making them more adhesive. It is to be observed that the crest of the cold wave, with zero temperatures, was on December 30 and that by the second of January the patient was definitely ill (C).

After this time the dating of the record is fragmentary, although on February 23, pain was noted (Fig. 6, D) and the patient was admitted to a hospital for study. A meteorogram indicated the passage of a major cold air mass at this time. The patient became worse around the period indicated by F. Again we note that a major polar air mass had passed, with its crest on the eighteenth of the month, and barometric pressures were unusually high.

On admission to the Research and Educational Hospital (Fig. 6, G) a diagnosis was made of subacute bacterial endocarditis and blood cultures indicated the presence of streptococci. On inquiry it was learned that in the spring of 1934 the patient had had a streptococcus pharyngitis and as a child a rather severe scarlet fever. On examination numerous petechial hemorrhages were noted in the skin, and the lymph gland under the left side of the mandible was tender. The thyroid, too, was palpable, the heart borders were approximately normal, and there was a presystolic thrill at the apex and a rough systolic blow, loudest at the mitral area.

April 24, the patient complained of a slight chill (Fig. 7, H) and at midnight, of a pain in the chest. This was followed by a considerable rise in temperature on the following day. April 30 at 9 in the morning, the patient suddenly observed that she could no longer see out of her right eye (I). No pain was associated with this episode. May 3, there was pain in the left leg; May 4, nausea and discomfort. The patient's condition continued with temperatures up to 103° F. May 24, the patient had a chill (J). On the third of June nausea was experienced during the night and this nausea persisted during the course of the next day (K); this happened again (L) on June 8. There was a great deal of coughing on the tenth and on the twelfth a pain in the abdomen accompanied by distention occurred. June 14, the right eyelid was swollen and pain in the right side developed. On the seventeenth the patient was drowsy and cold; on the eighteenth, delirious; and finally, she died on the nineteenth of June (M).

When we now examine the meteorologic associations with these episodes after admission to the hospital, it will be noted that with the next great temperature swing the patient developed an embolic process (H), and attention should be called to the fact that this coincided with the period when the preceding patient developed his dental disturbance; namely the acute toothache. With the cold wave that now followed (I), this patient developed a vascular disturbance of the eye, was nauseated, and had a nose bleed. This coincided with the time when the preceding patient developed endocarditis following tooth extraction. May 3, the patient developed another embolic process in the leg.

The chill of the twenty-fourth of May occurred with the passing of a polar air mass (J) and the terminal activation (K and L) was associated with a similar situation. Death finally occurred (M) with a sharp rise in barometric pressure.

1853 *Polk Street.*

The Editor's Page

ALL ECONOMIC LIFE is interrelated. Complete independence of one unit in the economic order from the other units is impossible. Our values change from the vantage point we occupy as we watch economic life move around us. Our education, our heritage, our conditioning, our resources, our opportunities—all influence our points of view with respect to what is worth while and what is inconsequential in economic life. The materialist says that the wealth of the nation is rooted in the soil and in the products of the mills and factories. The humanist says that wealth is rooted within the people themselves; that their health, their minds, their spirits comprise the values. We have a federal Department of Agriculture and a separate Department of Commerce to attend to the economic affairs of farmers and business interests. But we have no separate federal Department of Health with a place in the President's Cabinet. Our health and cultural activities, good as they are in many respects, are sandwiched into other and more materialistic departments of government.

The emphasis that we have placed in the United States on the conservation of natural resources is highly commendable. The remarkable job that is being done by the Soil Conservation Service is an example. We are told by this Service that "The American people have awakened to this stealthy pillage of their land, and on millions of acres they are now supplanting waste with conservation . . . Half of the land area of the United States is being attacked by soil erosion . . . . American farmers every year suffer direct losses as a result of soil erosion that are valued at $400,000,000. Further costs to the Nation, aggregating many millions of dollars, are imposed by damage to highways and railroads, and by silting of rivers, harbors, and reservoirs, caused by soil erosion." The analogy between the costs of soil conservation and the conservation of health is significant because the correlative is so much costlier and is still largely unheeded. The American people have not yet awakened to the stealthy pillaging of their health, millions of them have never learned the value of health conservation. Not only half the people but more than 90 per cent are sufferers from dental disease. Whereas the farmers of the Nation lose each year 400 million dollars, the people of the Nation pay more than that, three times more than that for health services, for the correction of diseases, many of which are preventable. Further, costs to the Nation are measurable not only in dollar terms but in terms of hours of pain, thousands suffering from insanity, squalor and unhappiness, and uselessness to themselves and society resulting from ill health.

In the parlance of soil conservation workers, such expressions as "erosion," "gullies," "abuse of land," make frequent appearance. The entire emphasis in the soil conservation movement is based on the simple fact that from little abuses and negligences, catastrophic events develop. A wagon track in a pasture may be the beginning of a destructive gully. Grazing land too closely may be the cause of wind and water erosion and the skimming off of the rich top soil. Clearing the forests and destroying the underbrush allows rapid run-off of water and the silting of streams and lakes, with the destruction of cover for wild game life and fish life in the streams. From the little gully, from the hard brittle ground, from water running too fast on its way to the sea, floods are partly caused. From the intense cultivation of the prairie and the stirring up of the soil, the winds are free to carry dust in the air to produce the dust storms of the West. In the wake of floods and dust storms come privation and want and human misery.

The parallel between such conditions and human health is almost too apparent to mention. In the larger sense, they are interdependent. In the preventive sense, they demand separate attention. The cavity in the tooth that goes untreated may be the cause of catastrophic infection in later years. The diseased tonsil may be the precursor of an injured heart. In the day of enlightenment that we hope will come, we may foresee that this Nation will be as concerned with the conservation of human resources as it now is with natural resources, and that one day we will express as a Nation the view that health is more than an individual concern, that disease is a catastrophe not alone to the person who suffers but to the community and to the Nation.

The Problem of Esthetics in the Lower Anterior Fixed Bridge

B. F. SAPIENZA, D.D.S., Birmingham, Alabama

DIGEST

Two suggestions are made here which offer partial solutions to the problem of constructing a lower anterior bridge that satisfies esthetic demands, is serviceable, self-cleansing, and is of such a nature that damage to any part does not necessitate the replacement of the whole: (1) an abutment restoration for a lower cuspid and (2) a satisfactory pontic for lower anterior teeth.

The limitations in the use of the methods suggested are fully explained.

THERE ARE THREE important factors that must be considered in the design of a fixed bridge; namely, longevity, sanitation, and esthetics. The construction of a lower anterior fixed bridge possessing these three assets presents a problem.

The requirement of esthetics is satisfied occasionally by the construction of an all-porcelain bridge. Such a bridge, however, has its limitations as well as two disadvantages: the expense of construction and the fact that when any part of the bridge is damaged the entire bridge becomes worthless.

To obtain longevity, the demand for esthetics prohibits the use of the strongest abutment restorations; moreover, facings commonly used for pontics display gold on the incisal tip, even in cases in which a porcelain pontic is resting against the mucosa.

Two suggestions are made here which offer partial solutions to the problem of constructing a lower anterior bridge that satisfies esthetic demands, is serviceable, self-cleansing, and is of such a nature that damage to any part does not necessitate the replacement of the whole: (1) an abutment restoration for a lower cuspid and (2) a satisfactory pontic for lower anterior teeth.

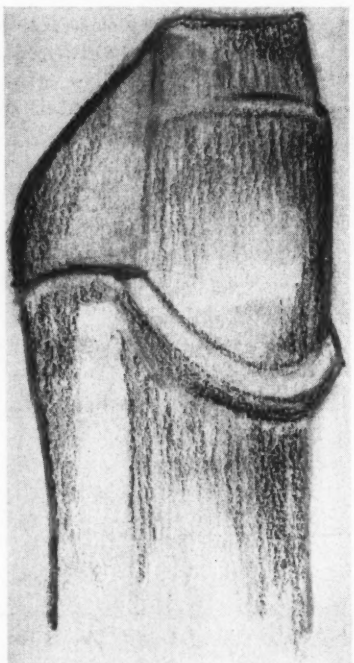

Fig. 1—Shoulder designed on labial surface of prepared tooth.

Technique for the Construction of an Abutment Restoration for a Lower Cuspid

In determining the kind of an abutment restoration to use on a lower cuspid there are deterrents to be considered: Maximum anchorage obtained by the use of a full-cast crown is prohibited because of esthetics. A three-quarter crown may be designed with sufficient anchorage but there will be a display of gold on the incisal area. It is possible to take full advantage of the anchorage afforded by the use of a full-cast crown, however, and still satisfy esthetic demands. This may be done by designing the labial surface of the crown for the reception of a porcelain veneer that will include the incisal cusp.

1. The tooth is prepared the same as for a full-cast crown,[1] as described in this magazine last month, except that a shoulder should be designed on the labial surface (Fig. 1).

2. A compound impression is taken in the manner usual for an amalgam die.

3. Carve a wax pattern as shown in Fig. 2.

4. After the wax pattern is made, insert carbon points where pin holes are required.

5. The completed casting is replaced on the die and an iridioplatinum wire, about 24 gauge, is designed and adapted (Fig. 3).

6. Remove the wire; carefully adapt and swage platinum foil (.001) over the entire surface.

7. When the platinum has been satisfactorily adapted, the platinum wire extensions are replaced through the platinum in the respective pinhole positions. The wires are held there by melting sticky wax over the wire and the surface of the matrix.

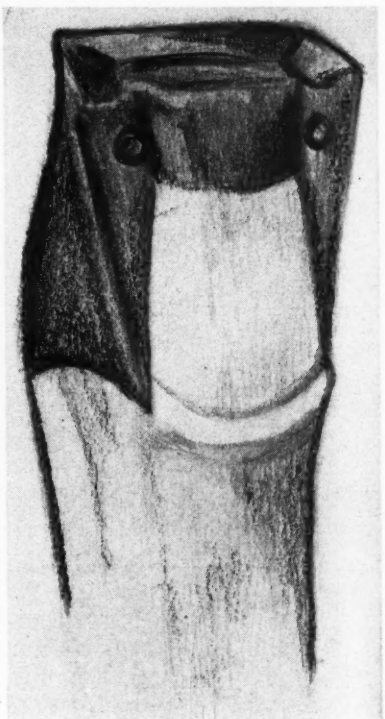

Fig. 2—Wax pattern carved.

[1]Sapienza, B. F.: Direct Method of Constructing a Full-Cast Crown As a Bridge Abutment, DENTAL DIGEST, 47:204 (May) 1941.

Fig. 3—Iridioplatinum wire (24 gauge) adapted to completed cast replaced on die.

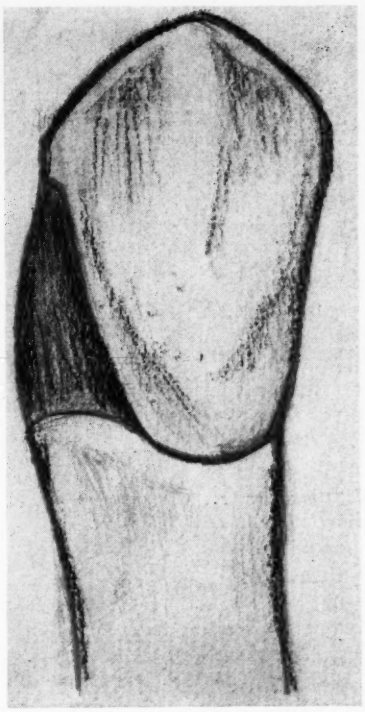

Fig. 5—Completed porcelain veneer in place on tooth.

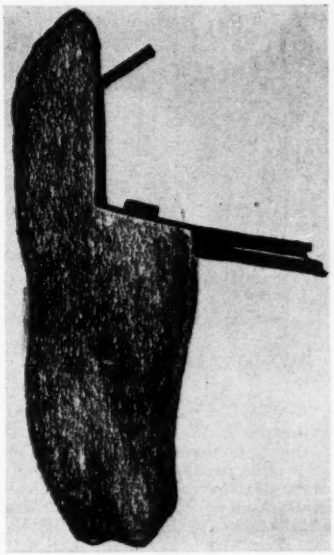

Fig. 8—Backing in position on the tooth. The lingual inner portion of this backing is filled with wax. A piece of metal is inserted to supply a handle for convenience. Sprue and cast with handle in position.

8. To remove this matrix, a handle is made by fusing a small piece of inlay wax to the sticky wax. This facilitates its handling while it is being invested.

9. Invest in the usual manner in high heat porcelain inlay investment.

10. Following the elimination of all wax, cover the wire extensions with opaque porcelain.

11. Place the body or gingival color.

12. Before baking, cut two small shrinkage grooves parallel with the long axis of the tooth.

13. Proceed with the first bake.

14. Following the first bake, replace the enamel or incisal color; fill the gingival shrinkage grooves and cut the incisal shrinkage grooves.

15. Proceed with the second bake.

16. Following the second bake, fill the incisal shrinkage grooves and any discrepancies that might have developed in previous bakes.

17. Proceed with the third bake. After allowing this to cool, remove the investment but do not remove the platinum.

18. Place the facing on the casting and die; disc off excess porcelain to the margins, and try-in.

19. After the facing has been adjusted for esthetics and anatomic form, glaze and remove the platinum.

20. This facing, when used as part of a restoration for a bridge abutment, must not be cemented into position until after the bridge has been cemented. Cementation of the facing should be a separate operation.

Fig. 6—An anterior pontic.

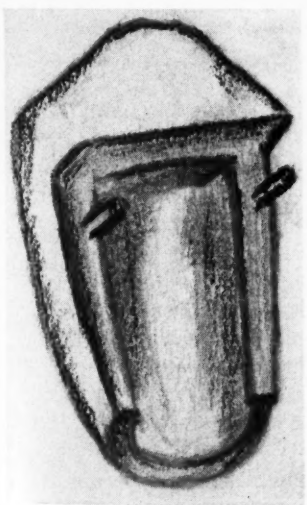

Fig. 4—Completed porcelain veneer.

Fig. 7—A, Backing for pontic; B, backing bent lingually, forming a shelf upon which to build the porcelain tip.

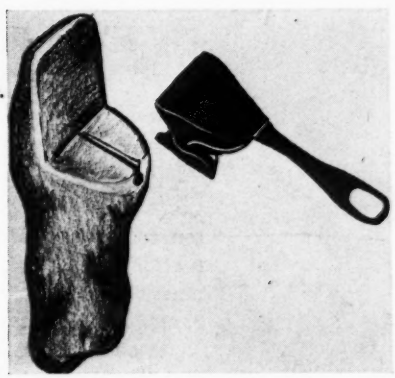

Fig. 9—Completed "jig."

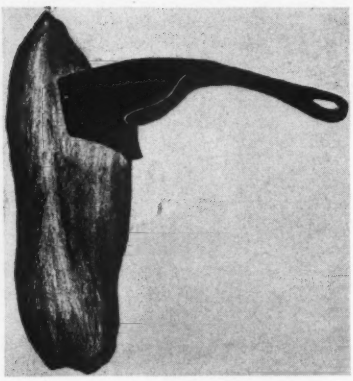

Fig. 10—"Jig" in position on the tooth, illustrating porcelain on the incisal area. This "jig" should be made wide enough to satisfy all widths necessary for lower pontics. Once the "jig" is completed a pattern is had upon which all porcelain tips may be made, thus facilitating repair in case of breakage.

Fig. 11—Use of a post when waxing up the lingual portion.

The application of this technique has its limitations:

1. This technique should never be used in close-bites.

2. It is suggested as an abutment restoration where esthetics is all-important to the patient. Care should be taken to ascertain the position of the pulp before preparing the stump.

3. This facing may be difficult to replace in case of breakage, the difficulty being encountered in an attempt to take an accurate impression of the damaged part. To obviate this difficulty, it is suggested that the operator make an amalgam die of the labial surface of this restoration with the completed casting in position on the amalgam die before using the abutment as part of a bridge, or before cementing the completed bridge. This is done by taking an impression of the finished casting on the amalgam die as shown in Fig. 2. A die is made from the impression and put on file. It is easier to take an impression at this point than it is to attempt the same impression in the mouth.

Fig. 12—Cross-section of a completed pontic.

Technique for the Construction of a Satisfactory Pontic for the Lower Anterior Teeth

The pontic for lower anterior teeth which is suggested here has porcelain on the incisal tip, porcelain resting against the mucosa, and is interchangeable in case of damage.

Inasmuch as the manufacturers do not make trupontics for lower anterior teeth, I use the upper lateral for this purpose. This trupontic may be designed for esthetics by adding porcelain on the incisal area. In order to make the pontic interchangeable, what I call a "jig," or a "master die" is first made, so that each facing may be placed on this "jig." All incisal tips are baked to the same dimensions. To eliminate confusion the technique for making this "jig," is shown in Figs. 6 through 14.

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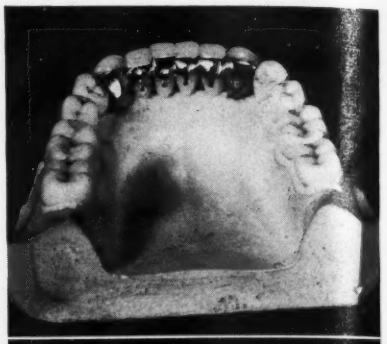

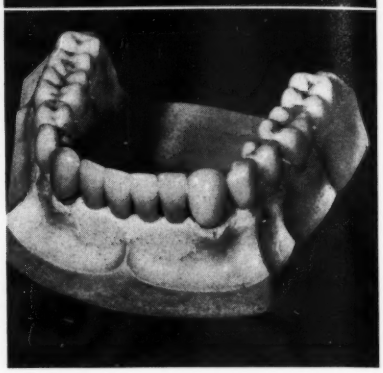

Fig. 13 (top)—Lingual view of a lower anterior gridge from cuspid to cuspid, illusthating the abutment and pontic restorations described.
Fig. 14—Labial view.

EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS OF THE NAVY

A competitive examination to select candidates for appointment in the Dental Corps of the Navy will be held on July 7, 1941, at the Naval Medical School, Washington, D.C., the Naval Training Station, Great Lakes, Illinois, and the Naval Training Station, San Diego, California. A candidate for apointment in the Dental Corps must be a citizen of the United States between 21 and 32 years of age at the time of appointment, and a graduate of a standard dental college.

A circular which contains full information relative to the Dental Corps and describes the method of making application for appointment can be obtained from the Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

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by Herbert G. Frankel, D.D.S.

ARE YOU INTERESTED IN MORE PATIENTS?: "Our big job," Doctor Frankel believes, "is to raise the one cent per capita to 5 cents per capita for dentistry." This article is chock full of plain facts and common sense.

DENTIST ESCAPES NAZI INVASION: Doctor Baude, a French dentist who found haven in America says, "Some of the French soldiers were toothless and many had mastication powers of less than 40%." This dentist participated in the evacuation of Dunkerque.

CALAMITY JANE'S DENTIST: Salty characters of the Old West made life exciting for Doctor William Frackelton. His patients back in 1893 included Calamity Jane, Frank Grouard, and Buffalo Bill Cody.

I WOULD WANT MY DAUGHTER TO BE A DENTAL HYGIENIST: A comprehensive rebuttal to Evelyn Folkers' article, "My Daughter Will Never Be a Dental Hygienist" which appeared in ORAL HYGIENE last October.

DENTISTS TRAIN ATHLETES AT ANNAPOLIS: This on-the-spot story tells how dentists, who are also well-trained athletes, aid in the toughening up process for Navy men at Annapolis.

Then there are three pages of pictures taken recently at Camp Grant, Rockford, Illinois, in the new Military and Defense News department.

Doctor Ryan's editorial "BY ENEMY ACTION" is sound thinking packed within two pages.

Three pages of Dentists in the News and five pages in the ever-popular Ask O.H. department. Technique of the Month is MICROSCOPICAL EXAMINATION OF MOUTH ORGANISMS, illustrated with eleven drawings. Oh yes, there is Laffodontia too, with eleven jokes that might induce a smile or two.

In your June ORAL HYGIENE

NOTES ON THE *Cuff*

Induced Business . . .

Every morning I walk through a business district where business seems to be improving. In this one street in one block are three establishments in the same kind of business. From what I can see as an outsider, all three of them seem to be doing better than they did a year or two ago. Their affluence seems to be out of all proportion to any general upswing in business. Their prosperity seems to be entirely of their own making. It began when one of these businessmen, whose father and grandfather before him were in business in the same location, decided to do something about the dreariness of his surroundings. He prettied up his store; built a new front; burned the old furniture; hung a new sign; new draperies appeared; grass seed was planted in the parkway; general renovating was accomplished. This upsurge seemed to be reflected in the manner of the people in the store. To me, as a passer-by, they looked brighter, better dressed, better spirited.

Soon one of the competitors, not so long established as the first house but its equal in its former drabness, also awakened to the possibilities. He bought some new lighting fixtures, some Venetian blinds, a sack of grass seed and some new shrubs for his parkway. The third competitor, not to be outdone, was jostled from his lethargy. He called in the painters and the carpenters and the landscapers. Where once three dreary business stores stood, there now stand three clean establishments. The competition among them seems to have lost its pettiness in reaching out to extend the possibilities of all three. The competitors are now seen in unaccustomed conversation with each other when leisure permits. It would be expecting a great deal of me not to make an application of this case to that of dental practice.

In any office building, in any city

or small town, where one dentist stirs from his inertia to burn his old furniture, put some fresh paint on the walls, knock out a few partitions, buy some new curtains or lamps, this should be a source of rejoicing for all dentists in the community, for all his colleagues. It should act as an impetus to the other dentists to examine their own offices and see where they might improve their own environment and the general appearance of the locality. Such improvements are quickly reflected in the comments and attitudes of patients. When the mausoleum pieces are thrown out and some of the cast-out furniture from home is likewise discarded from the office, patients approve this change and reflect it in their expressions and feeling.

In whatever community dentistry is on a low plane, there you will find these symptoms: dismal offices, down-at-the-heel dentists, jealousies and price-cutting; no enthusiasm for dental society activities; lack of appreciation on the part of the public for the dental service. There is nothing wrong with dentistry except the attitude of dentists—and that is reflected in the mirror of the public.

Oracles in Print . . .

Swivel chair physicians and dentists are not ordinarily thought of with great respect by their colleagues. The health columnist occupies a place by himself. He sits on his own little Mt. Olympus and prints answers to questions that would be hard for his clinical confrères to utter. The men who see tongues, feel pulses, thump chests, look at tissues, watch malformations develop—these men usually cannot be dogmatic. But the columnist who is not a practitioner can thunder unqualified replies from his remote pinnacle. Recently a sufferer consulted a health columnist on the question of the lines and wrinkles on his face. The columnist answered without flinching that lines and wrinkles in the face represented an inevitability and a natural part of the ageing process. He mentioned nothing about the conditions that cause certain avoidable lines and wrinkles; nothing about what happens to the lower part of the face as a result of loss of teeth or loss of vertical dimension. He said nothing about the facial collapses that follow the loss of teeth nor did he mention the grimaces and habits and tics that

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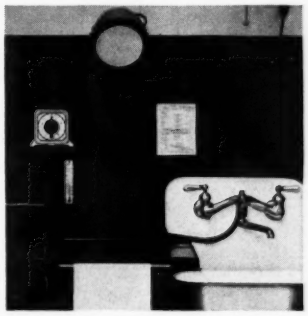

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frequently develop in the attempt to conceal bad teeth and bad dentistry. He could have told this inquiring person that good dental care can do more to preserve the structures of the lower part of the face than any single factor. Dentists, to be sure, cannot ward off the natural ageing process but they can do a great deal to carry people over the physical and psychological humps in the road which produce facial changes and disturbances.

So far as I know, none of the erudite psychologists has ever written on the subject of habits of concealment. People with bad teeth or missing teeth develop habits of concealment which are destructive to the personality: Placing the hand before the mouth, for example, or before, a part of the mouth; twisting the mouth to a side to cover up an area; rigidity of the upper lip to hide the anterior teeth or missing teeth; talking with the lips closed, so that some impairment will not show; the fear of laughing with vigor, of smiling fully, of speaking out clearly—these are some of the habits of concealment which insidiously alter the personality. The more we think in these terms, the clearer we see that the dentist is concerned with the complexities of psychology as well as abnormalities of anatomy and physiology.

The Patient Speaking . . .

In dental practice many unexpected remarks, not intended to be funny, are made by patients. In one day three such remarks were made to me, not, curiously enough, by uneducated people but by patients with more than ordinary educational opportunities.

The first concerned superstition. The man insisted on putting in his lower removable bridge before he placed the upper because on one occasion when he placed the upper first, bad luck dogged him all day.

The second concerned the effect of falling bombs on the teeth. The chap who mentioned this is a graduate of one of the large Eastern universities. He was told, he said, that the stringent dental requirements for military service were necessary because the vibration of falling bombs loosened teeth and if soldiers didn't start out with a fair complement of teeth, after a few bombardments, they would be in great distress and would soon be edentulous.

A third remark was made by a girl, a recent college graduate, who in referring to a high-spot on an inlay said, "It's back and slightly to the East."—E. J. R.

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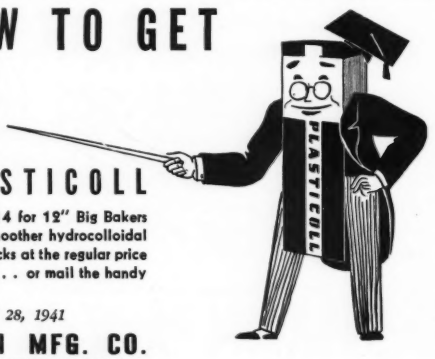

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•

Montreal Dental Club, seventeenth annual fall clinic, Mount Royal Hotel, Montreal, September 24-26.

•

American Dental Assistants' Association, seventeenth annual meeting, Texas State Hotel, Houston, October 27-31.

•

American Dental Hygienists' Association, eighteenth annual meeting, Lamar Hoter, Houston October 27-31.

•

American Dental Association annual meeting, Rice Hotel, Houston, October 27-31.

•

Odontological Society of Western Pennsylvania, annual meeting, William Penn Hotel, Pittsburgh, November 11-13.

•

New Mexico Board of Dental Examiners, regular meeting, June 23-26, Santa Fe. For information write to Doctor J. J. Clarke, Artesia.

•

Ohio State Board of Dental Examiners, regular meeting, Ohio State University, College of Dentistry, the week of June 23. For information write to Doctor M. H. Jones, 1553½ North Fourth Street, Columbus.